GINEERING
LIBRARY

JAN 2 1947

FACTORY

MANAGEMENT AND MAINTENANCE

DECEMBER 1946

A McGRAW-HILL PUBLICATION

The Road to Greater Productivity
John Lewis's Catch-All Unions

PRODUCTION

Production Planning—a Plant Operation Library Section
Handling by Conveyor in a Multi-Story Plant

MAINTENANCE

Revised Electrical Distribution for Greater Flexibility
45,000 Lubrication Points Serviced on Time Schedule

LABOR MANAGEMENT

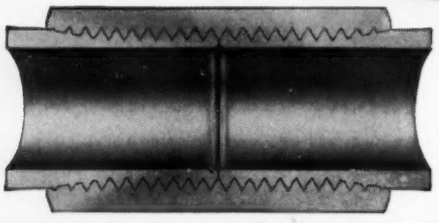
Decentralization Is Doing Things for These Concerns
I Know Our Workers and Their Problems

FOR COMPLETE LIST OF ARTICLES SEE PAGE THREE

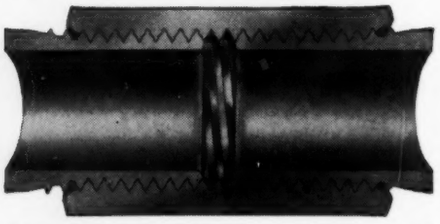
FULL WEIGHT—THREADED RIGID STEEL CONDUIT

SPECIFY National Electric SHERARDUCT

To Keep Wiring Safe, PERMANENTLY



SHERARDUCT COUPLING—All surfaces and threads are Sherardized. Accurately cut threads permit completely closed joints—no raw threads exposed, no gaps, easy fishing.



ORDINARY COUPLING—Raw threads meet raw threads—accelerates rust—weakens joint. Threads exposed in gaps trap wire ends—make fishing difficult.

When the job calls for a conduit that must withstand the test of time—there's only one Sherarduct! Sherarduct is a rigid steel conduit that is permanently rust-proof. The zinc protective coating alloyed to the steel by the special Sherardizing process will not crack or peel. Sherarduct is heavy-walled, threaded, bends easily, smooth inside to assure easy fishing.

National Electric
PRODUCTS CORPORATION
Box 897 — Pittsburgh 30, Pa.

FACTORY

MANAGEMENT and MAINTENANCE

DECEMBER, 1946

ALFRED M. STAEHLE, publisher

L. C. MORROW, editor
LEWIS K. URQUHART, managing editor

field editors:
G. A. VAN BRUNT, New York
CARL G. WYDER, New York
PETER FRENCH, New York
WILLIAM S. WHEELER, Chicago
CHARLES R. SCHUBERT, Cleveland

assistant editors:
WILLIAM C. SIMMS
CARROLL W. BOYCE
KATHLEEN NORTH
MILDRED GALE
KAY WHITE

consulting editors:
A. H. MOGENSEN
H. P. DUTTON
C. B. GORDY
WHITING WILLIAMS

HERBERT ROAN, art director
ALVIN ZIMMERLI, associate art director

DONALD D. HOGATE, Washington bureau

H. E. HILTY, sales manager

McGRAW-HILL PUBLISHING CO., INC.

James H. McGraw; Founder and Honorary Chairman.

JAMES H. McGRAW, JR., President; CURTIS W. McGRAW, Senior Vice-President and Treasurer; JOSEPH A. GERARDI, Secretary; NELSON BOND, Director of Advertising; EUGENE DUFFIELD, Editorial Assistant to the President; J. E. BLACKBURN, Jr., Director of Circulation.

Factory Management and Maintenance is a consolidation of Factory and Industrial Management (including "Factory") and Maintenance Engineering. Price 35c a copy. Publication office, 1100 W. Broadway, Louisville, Ky. Subscription rates—United States, U. S. Possessions: $3, 1 year; $4, 2 years; $5, 3 years. Canada: $4, 1 year; $6, 2 years; $8, 3 years. Pan-American countries: $6, 1 year; $10, 2 years; $12, 3 years. Other countries: $15, 1 year; $25, 2 years; $30, 3 years. Please indicate position and company connection on all subscription orders. Cable address, "McGraw-Hill, New York." Member A.B.P., Member A.B.C.

Copyright 1946 by McGraw-Hill Publishing Co., Inc. All rights reserved.

Factory Management and Maintenance, December, 1946, Vol. 104, No. 12. Published monthly, McGraw-Hill Publishing Co., Inc. Editorial, executive and circulation offices, 330 West 42nd Street, New York 18, N. Y. Application for transfer of second-class entry to Louisville, Ky.

District Managers: G. E. Pomeroy, Boston; L. E. Crist, R. P. Rose, Chicago; R. C. Greiner, Cleveland; T. W. Van Winkle, Detroit; J. S. Cawley, Ralph T. Soule, New York; E. Macaulay, Philadelphia; R. W. Garrison, Pittsburgh; C. J. Coash, St. Louis. Other offices at Atlanta, Los Angeles, San Francisco, Washington, and London.

World News offices: London, Paris, Berlin, Moscow, Prague, Shanghai, Bombay, Mexico City.

VOLUME 104, NUMBER 12 • DECEMBER, 1946

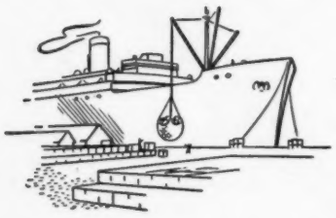
production • maintenance • labor management

THE LABOR CRISIS	*preceding page*	89
THE ROAD TO GREATER PRODUCTIVITY		89
WHY THREE-DIMENSIONAL LAYOUT		93
I KNOW OUR WORKERS AND THEIR PROBLEMS		94
REVISED ELECTRICAL DISTRIBUTION FOR GREATER FLEXIBILITY		96
WHAT TO DO ABOUT THE LABOR MESS		100
HERE'S A FLOOR FOR SEVERE SERVICE		105
SAFETY TALKS TO NEW WORKERS LOWER ACCIDENT RATES		106
WE MAKE SURE OUR SPRINKLERS ARE READY		108
THREE-WAY CONTROL FOR LOW-COST OPERATION		110
PHYSICALLY FITTING MAN TO JOB		113
45,000 LUBRICATION POINTS SERVICED ON TIME SCHEDULE		114
JOHN LEWIS'S CATCH-ALL UNIONS		118
PRODUCTION PLANNING—*Plant Operation Library No. 100*		121
DOUBLED PRODUCTIVITY BY GOOD HANDLING		133
HOW GENERAL MOTORS INSURES WORKER HEALTH IN ITS 91 PLANTS		134
WHAT'S AHEAD IN LABOR		136
WHAT'S AHEAD IN BUSINESS		137
HANDLING BY CONVEYOR IN A MULTI-STORY PLANT		138
WHAT WE HAVE LEARNED ABOUT UPKEEP OF PYROMETRIC EQUIPMENT		140
DECENTRALIZATION IS DOING THINGS FOR THESE CONCERNS		144
SIX-POINT PROGRAM FOR WASTE CONTROL		150
CARE AND HANDLING OF GAGES IN QUALITY CONTROL		153
SELLING THE INCENTIVE PLAN TO WORKERS		157
IMPROVEMENTS IN SHIPPING DEPARTMENT CUT COSTS 15 PERCENT		158

departments

OPERATING SHORTS *(outstanding methods briefly reported)*	160
MOTORS, CONTROLS, SWITCHES, AND RELAYS REVIEW	166
WHAT'S NEW IN EQUIPMENT	172
YOU WANT TO KNOW	234
SIGNIFICANT LABOR DEVELOPMENTS	244
THEY SAY AND DO	266
BEHIND THE BYLINE *(facts about FACTORY'S authors)*	292
BOOKS AND BOOKLETS	304
ON THE CALENDAR *(national meetings for plant operating men)*	310
CATALOG SERVICE *(announcements of manufacturers' literature)*	320

BETTER PLUS PROTECTION . . . . than Debit Memos



In filling export orders be sure that you are doing a complete packaging job . . . be sure that your corrugated shipping boxes provide that extra margin of safety that protects your products against the dangers of distance shipping, thereby eliminating costly damage payments.

EXPERTLY ENGINEERED FOR SAFE DELIVERY

A correctly engineered shipping box combines maximum protection with maximum economy . . . eliminates the need for over-packing. H & D shipping box engineering . . . that certain skill that comes from the H & D Package Laboratory, makes sure that your merchandise will arrive safely, and ready for quick selling . . . no matter how far it travels or how rough the journey. See for yourself how H & D packaging experts can help you plan engineered boxes which assure you safer shipping, increased customer good will, extra sales for your merchandise. Write for the booklet, "How To SHIP in Corrugated Boxes." The Hinde & Dauch Paper Company, Executive Offices, 4602 Decatur St., Sandusky, Ohio.

REG. U. S. PAT. OFF.

H&D HINDE & DAUCH

AUTHORITY ON PACKAGING

FACTORIES IN: Baltimore • Boston • Buffalo • Chicago • Cleveland • Detroit • Gloucester, N. J. Hoboken • Kansas City • Lenoir, N. C. • Montreal • Richmond • St. Louis • Sandusky, Ohio • Toronto

THE LABOR CRISIS

..."Absolute power corrupts absolutely"

THE NEW CONGRESS is going to overhaul the federal laws governing organized labor. If the election returns left any doubt about that, John L. Lewis has removed it by torturing the nation with its second soft coal strike in six months.

If, however, the overhauling is to get at the roots of our labor troubles, it must go further and deeper than most of the proposals would go. Indeed, it must not stop until it has dealt decisively with that most basic cause of devastating trouble—the entrenched monopolistic power of enormous international unions, now concentrated in a handful of union leaders. Industry-wide collective bargaining is one outgrowth of this power.

"Power tends to corrupt, and absolute power corrupts absolutely." That great truth, phrased by the historian Acton, is as true of labor leaders as it is of business leaders, princes or potentates. It is also true that John L. Lewis and some of his fellow labor leaders now wield what approaches absolute power in their respective domains. Failure to recognize these facts and act on them can make a tragic mockery of the present opportunity to restore good sense and good order to our labor relations and our national life.

To realize this opportunity the labor monopoly must be made a major target.

In the minds of many people, particularly in the business community, the root cause of our labor troubles is to be found in the National Labor Relations Act, commonly called the Wagner Act. They feel that if they could get rid of the one-sided handling of a number of key labor problems provided by that act and its administrators, we would have the legislative part of the problem of creating good labor relations pretty well solved.

To be sure, there is occasion, long overdue, to balance up the lopsided treatment of labor relations by the Wagner Act and those who apply it. It has been so interpreted and applied as to deny free speech to employers. On occasion it has extended the special protection of the federal government to workers striking to force employers to break the law. It has done the same for workers striking to force the federal government to change its policy the way the strikers want it changed.

The Wagner Act has required employers to bargain with unions, but imposed no companion obligation upon unions to bargain with employers. It has given protection to workers who have broken their agreement by striking. It has been applied so as to break orderly lines of management by encouraging and giving special protection to union organization of foremen who, to do their work efficiently, must represent management. Abuses such as these should be cleaned up, and soon.

Monopoly is the Target

But if perfection were attained in eliminating all of the abuses stemming from the Wagner Act, numerous and grievous as they are, the basic problem of establishing the legislative foundations of sane and safe labor relations in the United States would by no means be solved. John L. Lewis and his fellow labor dictators would, no doubt, be annoyed, but their power would not be seriously impaired. *That power is derived from monopoly control of labor.* Just as in the case with any other kind of monopoly power, it will only be made subservient to the public interest by attacking it at the source and smashing it.

The way to do that is to apply the anti-monopoly laws to monopolies in the field of labor just as they are applied to business and industrial monopolies. At the same time more vitality should be pumped into these laws all along the line.

When our basic anti-monopoly law, the Sherman Antitrust Act, was passed in 1890, it was designed to apply to economic monopolies of all kinds, and was so held by the courts. Organized labor sought exemption from this law, largely on the ground that its bargaining power was weak, as compared with that of industrial corporations. In recent decisions, a majority of the United States Supreme Court

justices have held that, when combined with the Clayton Act of 1914, the Norris-La Guardia Act of 1932 gives organized labor virtually complete exemption from the antitrust laws.

In the meantime, the relative weakness in bargaining power which was made the occasion for exempting organized labor from the antitrust laws has become a myth. In soft coal, John L. Lewis is the monopolist. Through his United Mine Workers he controls about 90% of the miners. No one of the thousand or more highly competitive companies engaged in soft coal mining controls more than about 5% of the output.

In steel the monopoly control is that of Philip Murray's United Steel Workers whose organization represents well over 80% of the production workers in that industry. United States Steel, the corporate "giant," controls only about one-third of the steel making capacity. In automobiles the United Automobile Workers represent about 90% of the production workers. A year ago the union's officers flaunted their monopoly power by announcing plans to pick off one automobile manufacturer after another by a series of centrally controlled strikes.

Industry-Wide Bargaining

Confronted by the rise of government-fostered monopoly power in the hands of organized labor, employers in some industries have sought to match it by joining together for collective bargaining on a more or less industry-wide basis. In other industries, notably steel, the federal government, through the War Labor Board, took the lead in forcing a pattern of industry-wide bargaining. Bedevilled by a myriad of cases, the Board thus sought to settle scores of them in the steel industry by one action.

It is easy to understand how an employer, confronted by an industry-wide monopoly of labor, would be tempted to join with his fellow employers in an industry-wide bargaining group. In that way he might see a chance to establish something like equality in bargaining power.

However, if the employers' bargaining group were as effective as the union in creating a monopoly set-up, it would merely confront one monopoly with another. That, in turn, would heighten the chances of having either a devastating head-on collision as a result of failure to agree, or having the two monopolies reach an agreement at the expense of the consuming public.

Actually, however, the chances that employers can create an industry-wide bargaining group as tight as that created on the side of labor by union organization are virtually zero. For if a group of employers were to agree to shut down in unison or take other united steps to balance the bargaining power created by the threat of a monopolistic union to strike, they would unquestionably find themselves on the receiving end of an indictment for violation of the federal antitrust laws.

To Break the Monopoly

Thus, both from the point of view of the public and the point of view of the employer, industry-wide bargaining is no effective offset to the monopoly power created by industry-wide unions.

The only way to cope with this monopoly power is to subject it to the anti-monopoly laws in the same way business and industrial management are subjected. In the process industry-wide labor monopolies would be cut down to safe size, possibly by limiting the percentage of workers in any industry who are permitted to belong to a single labor organization.

Also application of anti-monopoly laws would clean out local pockets of labor monopoly which block the way of industrial progress. As matters stand, the freedom of unions from control by the antitrust laws permits organized workers in one city to refuse to install equipment shipped in from another city, thus establishing private tariff walls. It also permits organized workers to refuse to install or work on materials made by other workers whose union affiliation, or lack of it, they do not like.

If the anti-monopoly laws were applied to organized labor, boycotts of this sort would be outlawed. In the aggregate they now take a tremendous toll for no legitimate purpose. But primarily John L. Lewis and a handful of his fellow labor dictators might be cut down to a size that can be safely accommodated by the American democracy. If that is not done, the last great opportunity to give industrial and political democracy a chance to work, in its last great stronghold, will be lost. From such a tragic turn of events no one would lose more than the American worker.

President McGraw-Hill Publishing Company, Inc.

FACTORY
MANAGEMENT AND MAINTENANCE
L. C. MORROW, EDITOR

THE ROAD TO GREATER PRODUCTIVITY

Suggested here is the path that must be followed in the long run if the American economy is to be productive of the high standard of living to which all Americans aspire. Government, as well as management and labor, will have great influence upon what transpires in the management-labor relationship, and is therefore treated quite as fully as the other two.

The idealistic picture of what all three working together should accomplish, is an economy with plenty for everyone. It would afford high real wages, low real prices, full employment within a practicable meaning of the term, a condition of mutual trust between management and labor, and a feeling of confidence by both in government.

WHAT MANAGEMENT SHOULD DO

It is relatively easy to state the things that management should do. First, it is the obligation of each and every person holding a responsible job in industry to become satisfied in his own mind about the economic facts of life, and then to do his best to live up to them and also to pass along to his fellow-workers, including wage earners, information concerning them.

Oversimplified, the economic facts to which I have reference are those that I have implied in this article—namely, that efficiency in manufacture brings about low production cost, which can be translated into low selling price, great volume of distribution, and therefore manufacture, and therefore jobs—all of which means high standard of living.

The time is ripe for educational work to be done. National surveys carried out under FACTORY'S direction have convinced me that the wage earner is susceptible to the educational efforts of management as well as those of organized labor.

The great majority of the people of the nation are not going to study out economic facts for themselves. Yet that great mass controls what our economy is to be. Normally they depend, wittingly or unwittingly, upon their work associates and their work leaders for their adult education. For that reason those leaders have the obligation to be as well informed as possible in the interest of social progress. They should recognize and fulfill their economic responsibility.

There are several items that I feel I should mention. One is the sanctity of contracts. Repeatedly unions claim that the workers dare not produce as much as they could because of the certainty that their rates will be cut. I am confident that the great majority of management does not cut rates and time allowances. However, not enough workers are convinced that this is so. A published statement by management that it will not make cuts without

major change in method, tooling, or equipment would help greatly to establish worker faith in employer integrity.

Another item is technological unemployment. Let all of management preach the truth of the matter, which is that technological improvement makes jobs. But let management not forget that to the man who loses his job because of a more productive machine, or a different method, or a different material, technological unemployment is real. His case story is very convincing to his circle of friends. And so the belief that machines destroy jobs is spread.

It is a matter of record that output per man-hour in factories increased, over the long period while it was increasing, at the rate of not over three percent per year. Granted that the increases could not have been achieved without diligent work by wage earners, we shall have to recognize, nevertheless, that the great part of the increases has been due to what management has done. Can it not be that the people who would be displaced by this relatively slow increase in productivity can be kept at work, letting normal departure from the working force—due to betterment, retirement, death, dismissal for cause—balance the working personnel with the lessened labor requirements?

A third item is stabilization of employment. Not every employer can provide a guaranteed annual wage for every employee. Yet there are many things that can be done to eliminate seasonal layoffs and otherwise to smooth out the peaks and valleys in production. Here are some examples:

A food plant raised the percent of employees continuously employed from 49 to 98 percent—an increase of 49 percent.

A leather products plant from 66 to 100—up 34.

A shoe plant from 84 to 100—up 16.

A wood-flooring plant from 0 to 90—up 90.

A textile plant from 7 to 57—up 50.

A chemical plant from 51 to 79—up 28.

A furniture plant from 29 to 94—up 65.

In each case several years were required to do the job. The maximum time was ten years.

A fourth item is active campaigning to secure revision of our labor laws. Fundamental, of course, is the Wagner Law. A long step forward would be taken if it were revised, as suggested by Gerard D. Reilly, recently retired member of the National Labor Relations Board, to:

1. Clarify the status of supervisory employees.

2. Withdraw protection of the Act from unions which strike for objectives contrary to the Act or which could be achieved by orderly processes under the Act.

3. Grant to the NLRB the power to cope with unions engaging in secondary boycotts.

WHAT LABOR SHOULD DO

In the Utopian picture that I have painted, it would be necessary that labor produce as much as possible of goods and services. It is only from increased production that higher standard of living can be obtained. Full production by labor under good management can bring about increases in wage rates as well as increases in real wages as measured by their purchasing power.

Full production by labor requires the removal of restrictions on production; the abandonment of feather-bedding; the cessation of malicious attacks upon management in the labor press and from the platform; and the expulsion of Communists from the ranks of labor administrators. It is impossible to achieve full production in an atmosphere of hostility and recrimination, of charges and countercharges, of strikes and stoppages.

Labor should recognize that the function of management is one difficult to perform and requiring trained specialists. It should forego any ambition it may have to participate in the function so long as it remains labor. This is not to say that labor should not participate in the setting of work standards and in the determination of some industrial relations policies.

Labor should recognize that the gains from technological development and from more effective production in industry must be divided four ways—to labor, to management, to stockholders, and to the public.

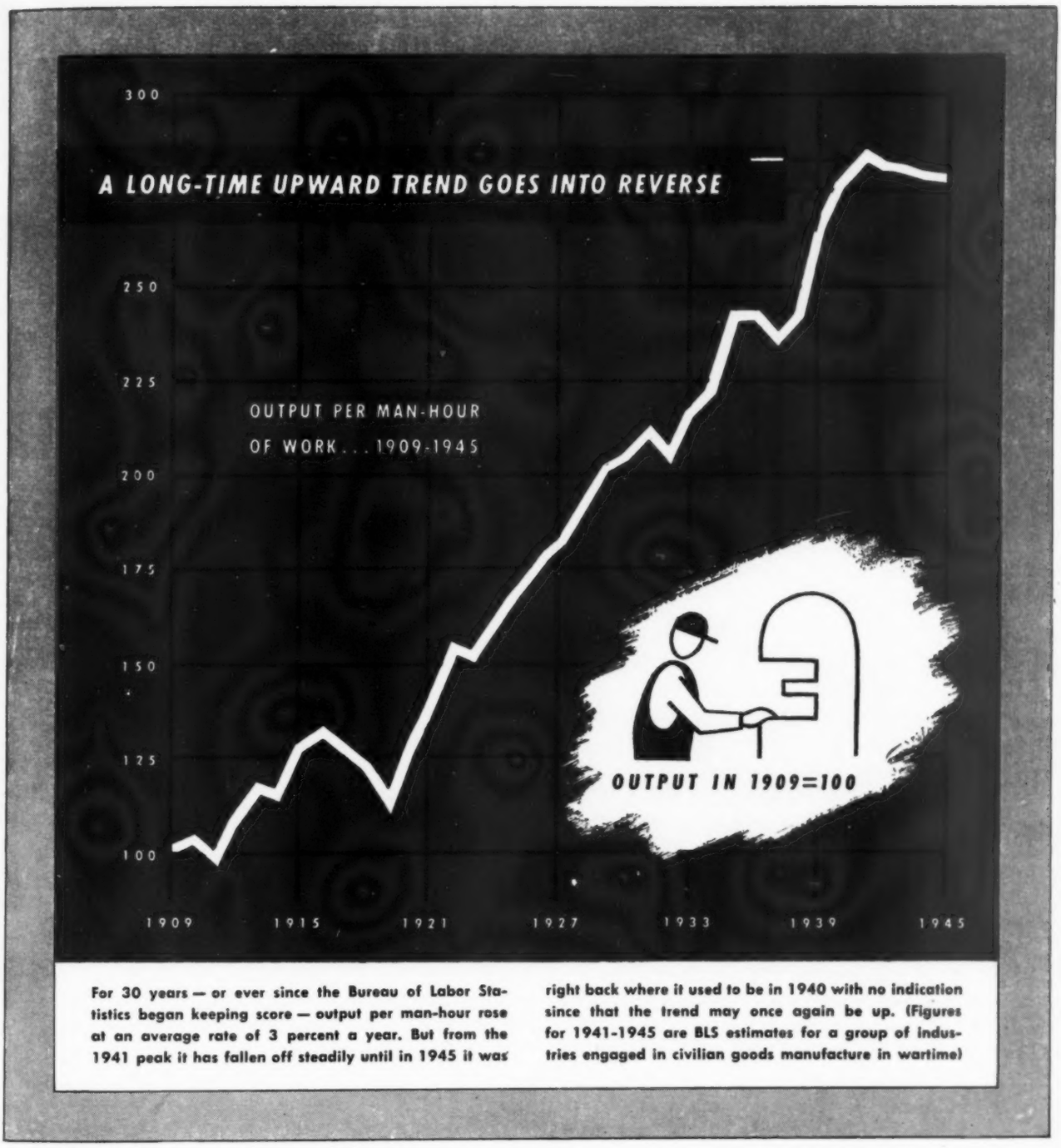
It was listed as management's responsibility to provide the equipment and methods by proper application of which maximum production can be secured; that the real burden of production always should be borne by machines. That is true, yet it must also be stated that the most highly productive equipment in the world contributes nothing to output if not operated. It is labor's obligation to operate it as effectively as possible.

Labor as well as management has its obligations toward sanctity of contract. Slowdowns and stoppages by workers in violation of contracts between unions and employers are matters of common knowledge. Labor's organization pains are now supposed to be over. The organizations are supposed to be mature. They should do a better job of living up to their contracts.

WHAT GOVERNMENT SHOULD DO

Management and labor need the right atmosphere in which to carry on their relations. That atmosphere must be provided by government, which makes what government must do a particularly interesting and important study.

Basically, the conception of labor relations as



For 30 years — or ever since the Bureau of Labor Statistics began keeping score — output per man-hour rose at an average rate of 3 percent a year. But from the 1941 peak it has fallen off steadily until in 1945 it was right back where it used to be in 1940 with no indication since that the trend may once again be up. (Figures for 1941-1945 are BLS estimates for a group of industries engaged in civilian goods manufacture in wartime)

fostered by the national government is wrong. Our basic labor law is founded on the assumption that the interests of management and labor are opposed. Therefore, the first corrective move should be the recognition by government that the interests of management and labor are the same. It should be followed immediately by whatever positive action would be required to encourage both management and labor so to conduct their bargaining that it would consist principally of figuring out how to produce more at less cost.

Government should then proceed on the basis that its real function is to see that nothing serves to deny to management and labor the opportunity to work cooperatively to see:

1. That labor is given increased compensation as production per man-hour is increased.

2. That every increase in wages received by labor is justified by increased productivity.

If government must subject workers to propaganda—a temptation that it seems unable to resist—

the effort should be in the direction of convincing them that:

a. The more work they do, the more certain they are of keeping their jobs, because the more jobs there will be.

b. Complete automatic economic security is not a possibility, and they have some obligation to look after themselves by means of their own efforts.

c. Part of the nation's tax bill always is taken from wages, and the higher the cost of government—including the cost of government-made jobs—the greater the percentage of wages paid out in taxes must be.

d. Prices of goods depend upon what people will pay, not how much the employer will ask.

e. Every increase in production cost results in lower real wages and therefore less purchasing power.

3. Honest employers and honest workers can get together and work out a fair deal when they build on the right foundation—which is producing more goods for more people at lower cost.

Government should greatly reduce its activities in the field of labor relations. It should take such action as will remove national emphasis from grievances and grievance procedures; and establish a balance between the "unfair practices" of labor and management. It should hold itself aloof from setting class against class, group against group, and offering to reward class or group with uneconomic alleged gains in return for support at the polls.

SIMULTANEOUS FREEDOM AND SECURITY

What I have indicated as the possible outcome of a harmonious understanding among labor, management, and government is in effect, though not with the guaranty of legislation, the possession of free enterprise and worker security at the same time. That is what can be ahead for management and labor.

When it comes about, both management and labor will understand the following economics of wage rates:

1. That labor is paid in proportion to productivity.

2. That the purchasing power per average worker is proportionate to the average output per worker.

3. That the purchasing power and employment opportunities of labor are greatest and best maintained in the industries paying out as wages the lowest percentages of value created by manufacture.

4. That the fewer the workers required per unit of time to produce the goods needed for a given population, the better that population lives.

Organized labor, for the most part, is seeking all the traffic will bear. How much the traffic will bear will depend upon productivity. Labor should be given all the traffic will bear when determined in the light of the economic relationships cited here. Labor makes up the greatest part of the population, and consumes most of industry's products. Its purchasing power must be kept as high as possible.

The interests of ownership, management, and labor are identical. If all three could recognize the few fundamentals that control the long-time economic position of wages, and work cooperatively to adhere to them, we should have none of the dangerous interruptions such as we had recently to the program of immense production required for our national welfare.

Management must see that there is extensive knowledge of these fundamentals. Inherent in its position of responsibility is the obligation of management to carry out a dual procedure with the objective of securing both greater output per man-hour of work, and greater over-all production. One part of this procedure is to provide the equipment and methods by proper application of which maximum production can be secured. The other part is to engender in the workers the desire to do their part in effectively using the equipment and methods.

Too long has management left to labor leaders, and to Communists, and to anti-industry representatives of government the privilege of telling the worker what industry is and what it does. Some of the basic truths that have been lost sight of are these:

1. We cannot have what we do not produce. Whether war or strikes prevent our factories from making the goods our living requires, the result is the same—we cannot have what we do not produce.

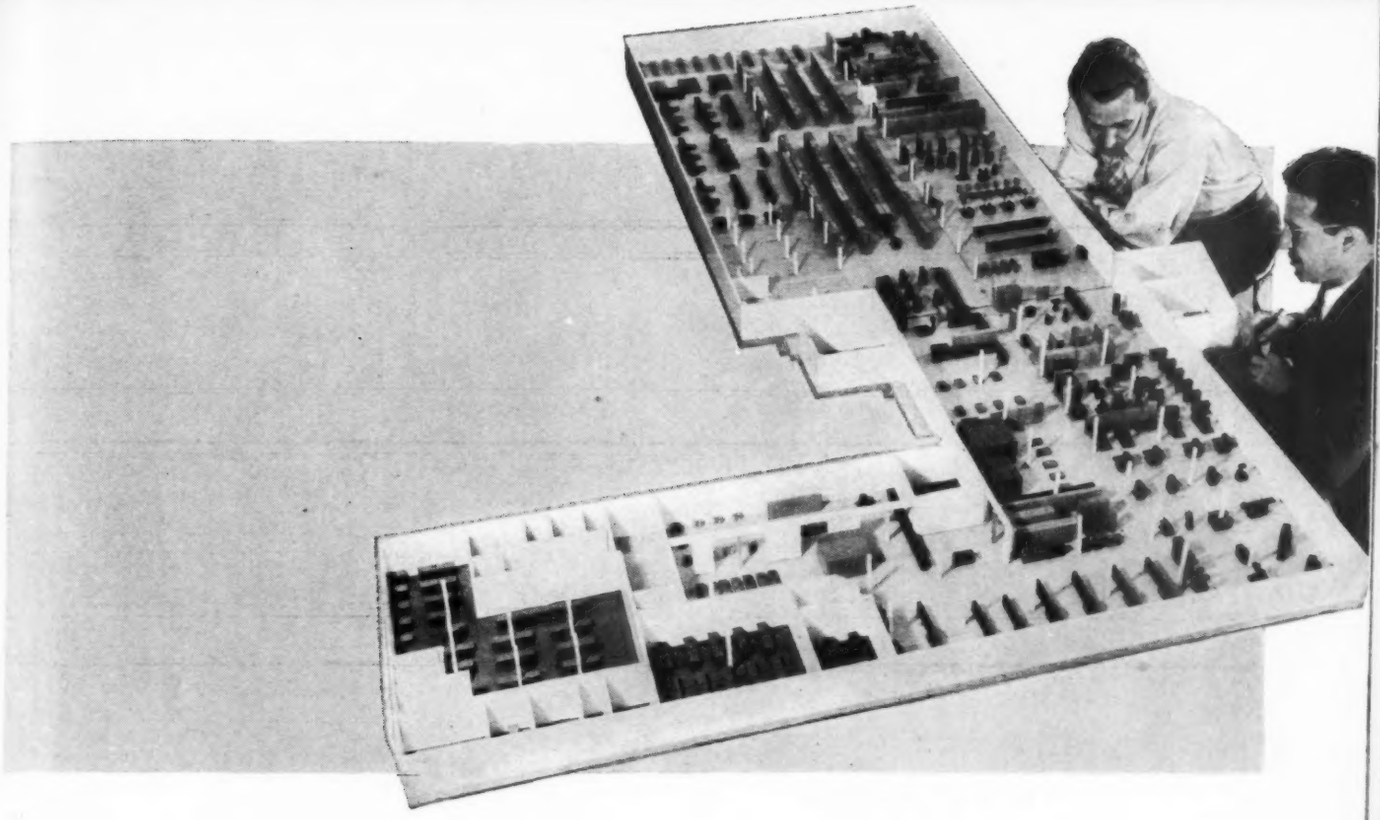
2. Only when the people as a whole produce a great many goods and services can the individual enjoy an extensive amount of them.

3. Idleness breeds unemployment, while work breeds jobs.

4. Low cost in producing and selling goods is all that makes possible low selling price, and therefore ownership by the many.

5. Most of the cost of producing goods and services is wages. Wages per hour may be ever so high if the number of units of goods and services produced per hour is correspondingly high.

6. The way to prosperity, to higher standard of living, and to higher wages is to make more and more goods for more and more people.



WHY THREE-DIMENSIONAL LAYOUT

FACTORY asked these seven questions, got these straight answers, about the use of three-dimensional layout at Ideal Industries, Inc., Sycamore, Ill.:

Q. What was your problem?

A. To provide an efficient factory layout that would utilize a new addition as large again as our previous factory area; also to redistribute departments and equipment in the old factory space. In short, complete layout and redistribution of equipment throughout the entire factory.

Q. What planning was needed?

A. We had a definite area to fill. Therefore we figured the approximate new space for departments and reproduced these areas by using sheets of colored paper cut to scale so they would represent a particular area in the department being worked on. This was a simple but effective means for providing outlines of the departments. The department pieces with definite areas were placed in the factory model and then, after determining the general flow line, we cut them and trimmed them, making them short, round, long, and every other way, but retaining the same area. After determining the exact area lines, we cut department templets of various colors to size, and placed them in the layout. Models were placed on top of them.

Q. Why did you use a model?

A. Because all factory layouts have to be approved by many people. Models help top management visualize manufacturing problems. They help "sell" top management.

Q. What type of model did you use?

A. Our models were wood, handmade to ¼-in. scale. This scale was dictated by the amount of room we could give to our factory model. Avoiding the expense and trouble of reproducing complicated machine forms in detail. Ideal approximated outlines and shapes. The three-dimensional effect was there and proved satisfactory for our needs.

Q. How much did the layout cost?

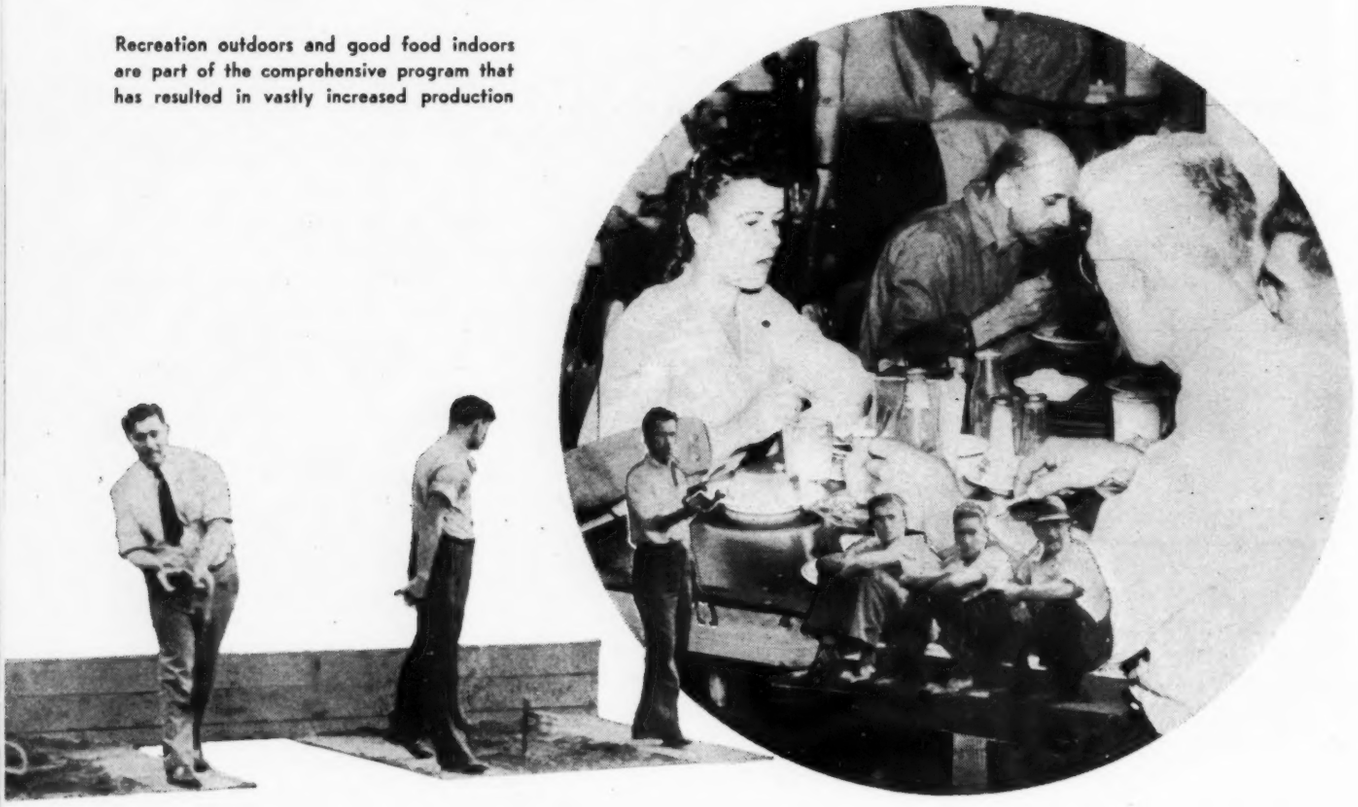
A. The cost was close to $300. Plywood and other durable materials were used to assure effective results.

Q. What were the chief advantages?

A. The use of models makes the layouts flexible. Models stay in place and do not have to be fastened. Members of any one department find it easier to understand layout in all departments when they can see scale models that help them visualize actual conditions.

Q. How accurate were final results?

A. We had excellent results with our layout and experienced very few slip-ups. On the whole, the preplanning done with the models and layouts accelerated the movement of machines and the installation of layouts. The actual move, as planned, was made rapidly and smoothly.



Recreation outdoors and good food indoors are part of the comprehensive program that has resulted in vastly increased production

I KNOW OUR WORKERS AND THEIR PROBLEMS

CURTIS G. WATKINS • PRESIDENT, SIMPLEX TIME RECORDER COMPANY GARDNER, MASS.

Management has more opportunity today than ever before to exchange information with employees—and thus improve their morale and attitude. It's simply a question of management's being willing to take the time to do so. That, at any rate, is the way we feel about it here at Simplex—and our hunch is based on experience.

One hour of my time each day is set aside to go through the shop with my coat off and say "hello" to employees, watching them work, asking them questions, calling them by their first names when I can. If I can't, I make up a name, like "Red," or "Shorty," or "Stretch," and they usually get more of a kick out of these pet names than out of their right ones.

It is part of my job to know if they have been recently married, or sick, or had a death in the family, and to make some appropriate remark. Keeping posted on their triumphs and defeats at horseshoes, baseball, and bowling provides ammunition for kidding the men in the shop.

Anyone who has never tried it would probably be surprised to find out how the man at the machine likes to see and say "hello" to the boss once in awhile.

But quite aside from the "morale" effect, these tours of the plant serve to provide a first-hand picture of what is going on. Any major troubles usually get thrown at me at once, so that action can be taken before they grow into serious affairs.

It is also a rule of the company that the superintendent must cover the plant once a day, doing exactly the same thing. Each foreman must visit every employee in his department the first thing each day, if only to say, "Good morning." Another rule: All social and athletic activities must be attended by executives, superintendents, foremen, and their assistants. *What is good enough for the factory employees is good enough for us.*

Management at Simplex considers it important that every employee be acquainted with his fellow-workers, and with the company and its policies. To that end, every new employee must first be approved by the foreman to whom he will report, and also be "sponsored" by some present employee of the company. Each new man is taken through the entire shop and shown, as a customer would be, what the company is doing and how important his job is to the over-all results.

WORKERS WANT TO KNOW

Each week an article pertaining to the company or its policies is placed on every bulletin board throughout the shop. A series of eight articles which appeared during the summer was entitled "Facts and Notes of Interest About Your Company." Some of the subjects covered were:

Number and size of our competitors . . . our standing in this group. Some of the employees thought we didn't have any competition—that all we had to do was walk out and get business. That isn't so, and today they know it.

Selling organization throughout the world. To illustrate this, large maps of the United States and of the world were placed in the shop, showing Simplex offices and the territories they cover.

Facts regarding the company and its policies. "Why we do what we do," explained in simple terms, with emphasis on how the employees' welfare is dependent upon the company's success, and *vice versa*.

In addition to the above techniques of keeping up with what's on the worker's mind, Simplex employs many of the customary methods of creating and maintaining good will. For example, it sponsors 14 bowling teams, a baseball team for which uniforms are provided, basketball, and horseshoe tournaments. There are banquets at the close of each season, a Christmas party and summer picnic, and dances throughout the year.

Recently the company started sending birthday cards to all employees. As president, I sign every card personally, and attach a new $5 bill. These cards are sent to the employees' homes, to insure that the Missus knows we are taking a personal interest in the welfare of her breadwinner. The dates, of course, are obtained from Social Security records.

A new cafeteria for the use of the shop employees has just been installed, and the plantwide public address system was rushed to completion in time to broadcast the World Series baseball games to all departments.

The company pays one-half of the Blue Cross and Blue Shield dues for each of the employees, and all of the expenses of group insurance, which runs from $1000 to $5000, depending upon the employee's classification. Length of service determines the amount of vacation, which ranges from one to two weeks, with pay based on a 50-hour week.

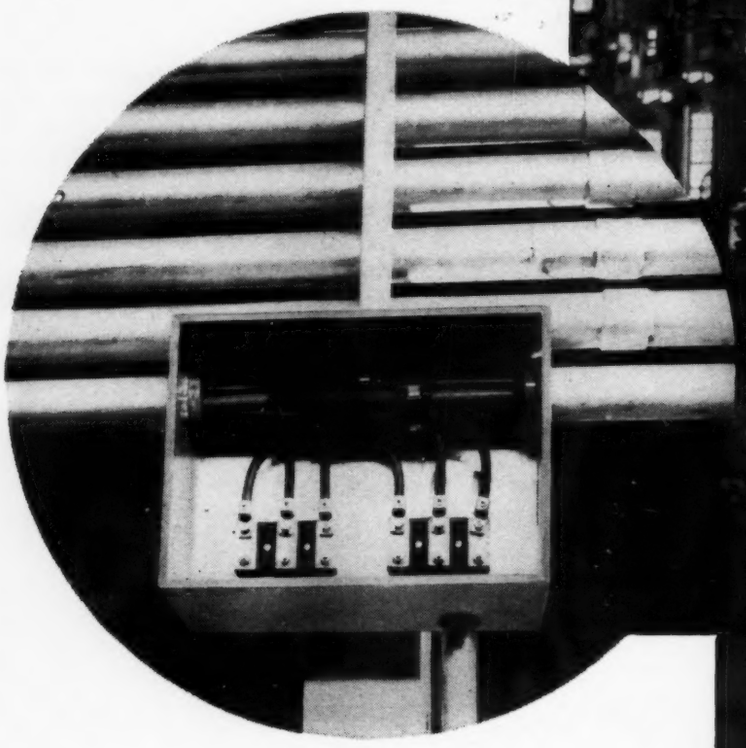
The result of all this has been that Simplex has worked a 50-hour week for both day and night shifts since 1941 without the loss of a single day because of labor troubles, shortages of materials, inventory taking, or any other cause.

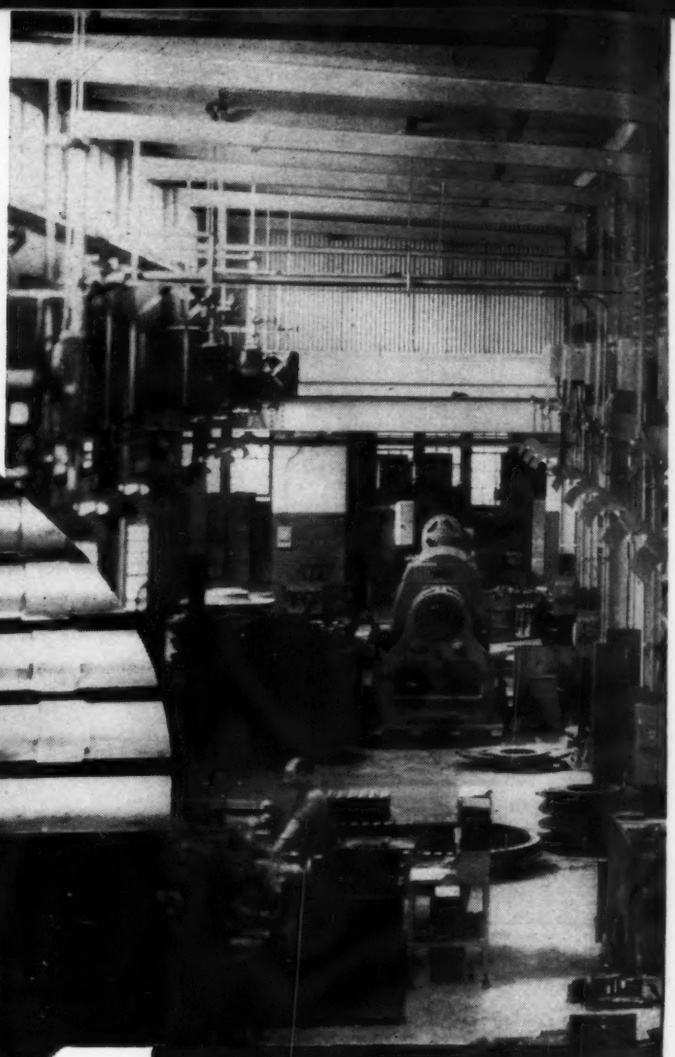
Partly because of these policies at Simplex, our employees have the highest take-home pay in the area. And partly because of these policies, a wage incentive plan inaugurated in April, 1943, has brought about an average increase in individual worker efficiency of 102.2 percent in the last three years.

These results have convinced me that management's opportunity today is to know employees better and to treat them as part of the team. Simplex is trying to make the most of that opportunity.

The president of Simplex has found that a daily personal greeting, a birthday card every year, pay their way in worker good will

A terminal box (below) is mounted on each building column. Columns are spaced 16 or 20 feet apart on centers. Fused switches at the bottom of the columns are connected through these terminals to the power feeders





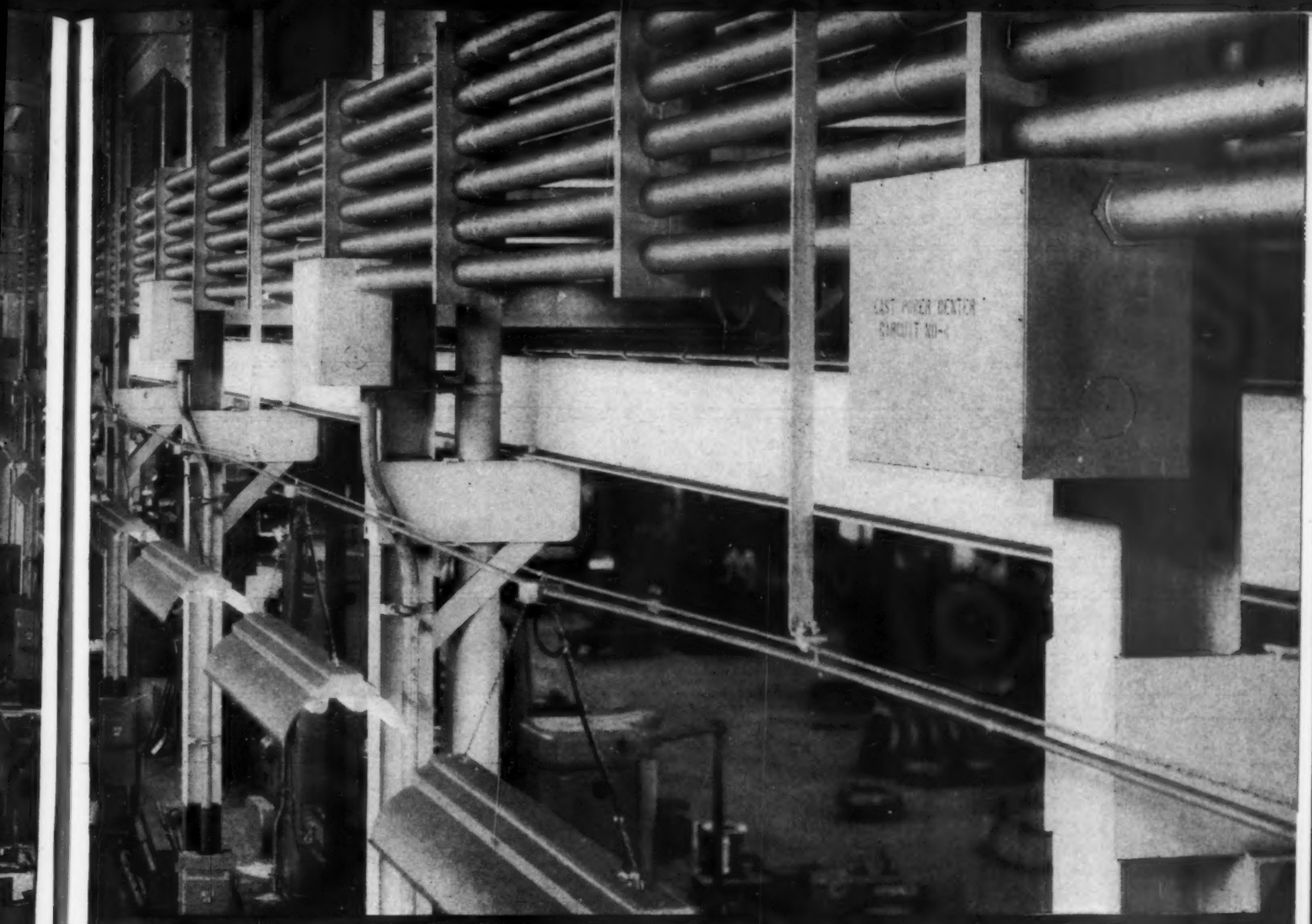
Chief advantage of Liquid Carbonic's new electrical distribution system is that changes in machine layout can be made quickly, without serious interruption to production operations

REVISED ELECTRICAL DISTRIBUTION FOR GREATER FLEXIBILITY

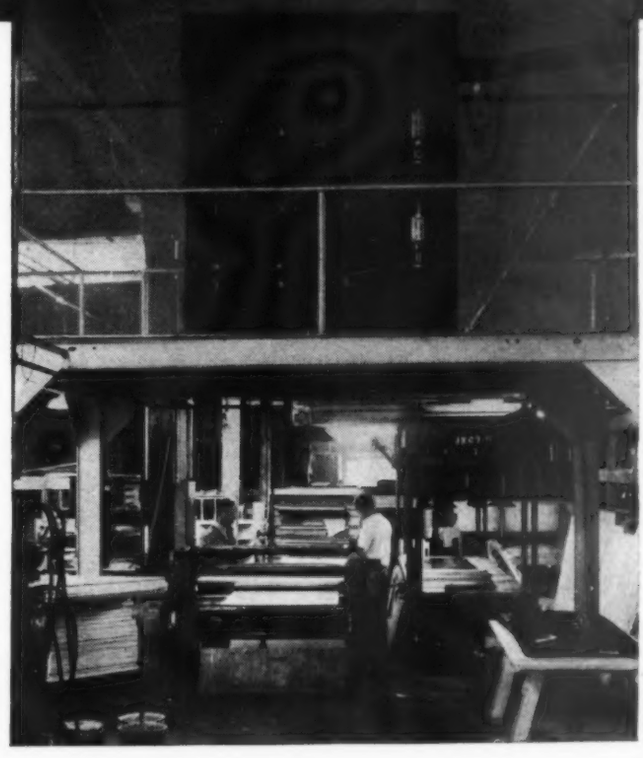
ROBERT B. BURTON • SUPERVISOR OF ELECTRICAL MAINTENANCE, CONSTRUCTION AND PRODUCTION, THE LIQUID CARBONIC CORP., CHICAGO

Revamping the electrical power distribution system in the Chicago plant of The Liquid Carbonic Corporation has been definitely advantageous from several standpoints. For example, changes in machine layouts can now be made more quickly and with less rewiring; power costs have been reduced; voltage regulation has been made better; and the appearance of the production departments has been considerably improved.

With the old system all power was distributed at 220 volts from two substations that, because of plant expansions, were a long distance away from points where the load was heavy. Hence there were many long cable runs from the substations to the panelboards throughout the plant. Installing or changing the location of a piece of power-driven equipment usually involved a considerable amount of wiring, which was costly in time and money. Branch circuits had to be installed,



Feeders from load centers to terminal boxes are carried in 3-in. conduit, whose light channel-iron supports are welded to building columns. From switchboxes, cables and wires are led to machines through conduits which are laid under the floor

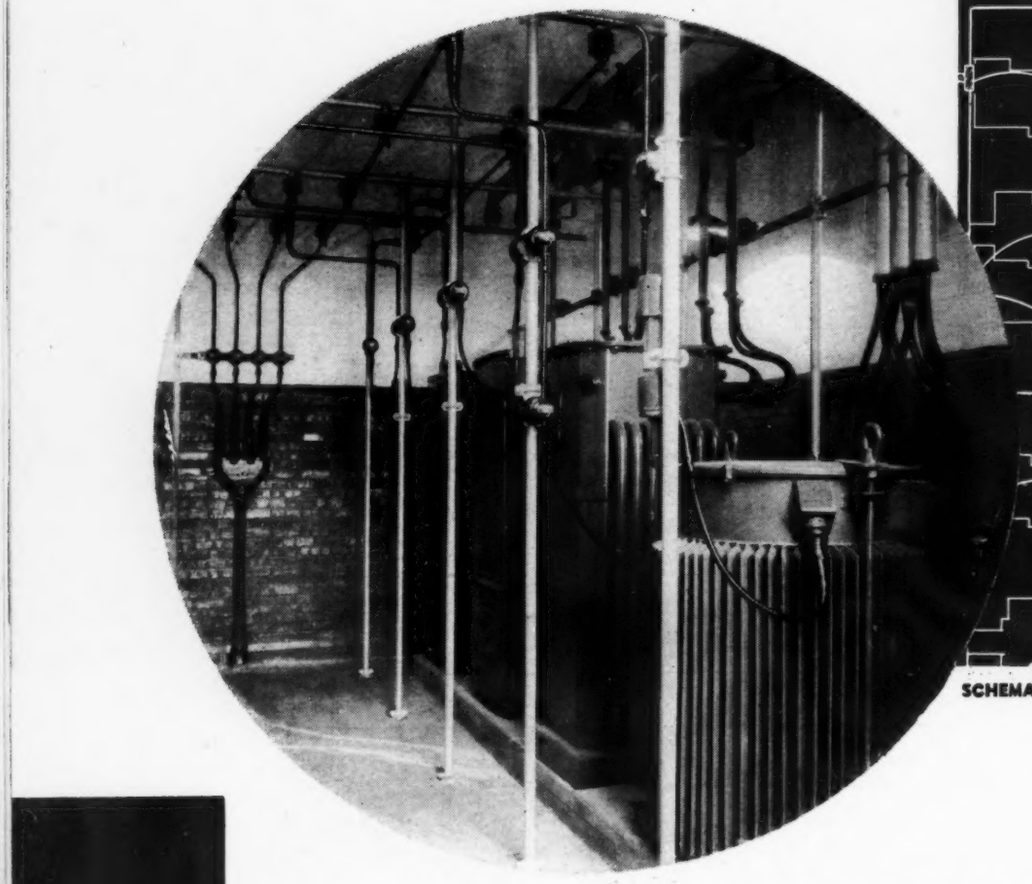


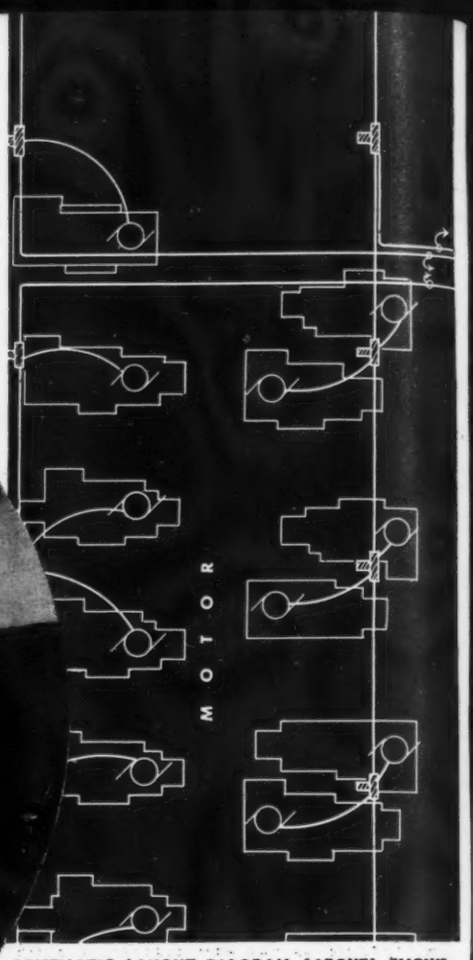
Load centers are mounted on platforms 9 feet above floor level, to free floor space. Each fused switch controls one lateral circuit

running from the nearest fused power cabinet to the machine. When any considerable number of machines were moved, the maintenance department had a major wiring job on its hands.

When the recent plant modernization program was started the construction division of the maintenance department laid out an entirely new distribution system which was designed to eliminate the inflexibility and power losses inherent in the old system.

Energy formerly had been supplied by the local utility at approximately 4140 volts. Expansion of production facilities, which was an important part of the modernization program, would have made it necessary to install additional 4140-volt circuits. These circuits were





SCHEMATIC LAYOUT DIAGRAM (ABOVE) SHOWS

Three 150-kva. single-phase transformers feed the load center in the machine shop. The 200-kva. single-phase transformer in the foreground supplies all lighting circuits in the machine shop area

not available from the utility; therefore, a main substation receiving energy at 12,000 volts, 60 cycles, three phase was installed. This substation is connected to the utility's high-tension network. It is supplied by two 12,000-volt feeders, so that if one fails, power will be available from the other feeder.

Seven secondary substations were installed at locations dictated by the power requirements. Since most of the secondary substations are at a considerable distance from the main substation, it was decided to supply them at 4140 volts. Transmission at this voltage made possible a considerable saving in copper, and it reduces voltage drop at machines.

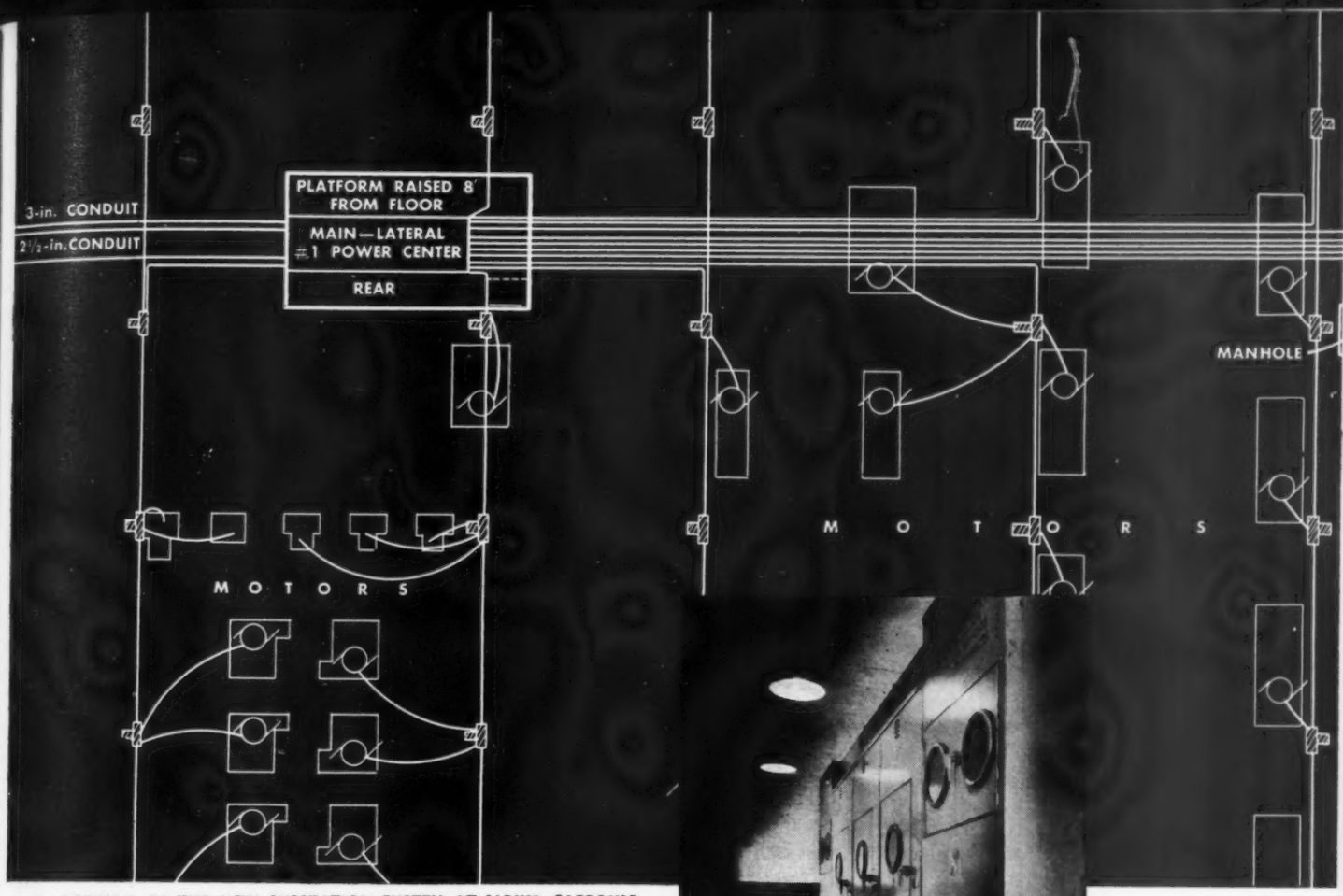
Load centers were then set up at seven locations in different parts of the plant. These centers, which are located on platforms to save floor space, consist of a group of fused disconnect switches, each of which controls one of the lateral power circuits, to be described later. All load centers are supplied at 220 volts by 4140/220-volt transformers in secondary substations.

With the old distribution system most of the main feeders were carried overhead, on poles or other supports. This method of supporting feeders was not altogether satisfactory, and it was decided to abandon it. Accordingly, all cables from the main 12,000-volt substation to the secondary stations and on to the load centers in the plant, were laid in underground ducts buried in concrete. That is, the ducts were laid in a concrete pit and a 4-in. envelope of concrete was then poured on top of them. The cables are thus protected from damage of any kind.

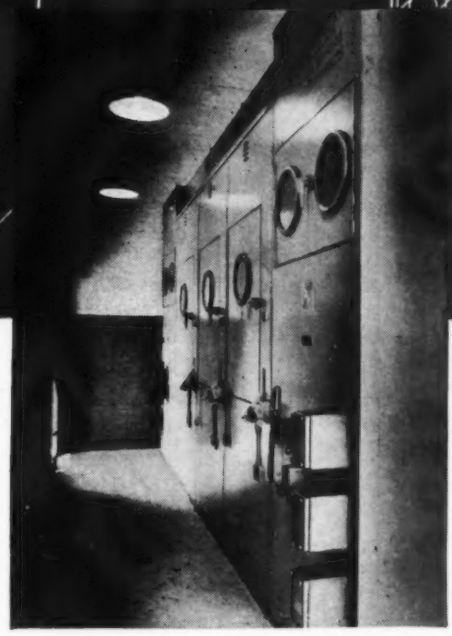
It is considered that the elimination of weathering of feeders, with a drastic reduction in the cost of maintaining them, will about pay for the underground installation.

From the load centers, lateral branches are run in 3-in. conduits throughout the plant. The conduits carrying the laterals are run through holes in light channel irons, which serve to space and support them, and are mounted overhead on the building columns.

A terminal box with connection facilities for two three-phase circuits is mounted on each column. From the terminal boxes feeders are taken down in conduit to fused



A PORTION OF THE NEW SUBSTATION SYSTEM AT LIQUID CARBONIC



Company side of 4140-volt switchroom adjoining 12,000-volt main substation. Glass portholes permit checking position of switchgear controlling secondary substations. Interlocks prevent opening of doors while high-voltage circuit breaker is closed

switchboxes also mounted on the building columns at a convenient height from the floor. Machines are fed from these switchboxes through cables in conduits installed under the floor.

As mentioned before, the lateral circuits mounted on each row of columns are controlled individually by a fused switch at the corresponding load center.

Moving a machine or motor requires only that the short length of conduit from the terminal box to the fused switch at the foot of the column be taken down and reinstalled with the switchbox in the new location. Holes in the terminal box at the old location are then plugged.

The lateral circuits along the building columns range from 4/0 to 500,000 cir. mil cable, while the feeders running down to the switchboxes are No. 4 wire to No. 2/0 wire, or one-third the size of the laterals.

Since the diversity factor of the lateral power distribution system is approximately 58 percent, No. 4/0 lateral circuits handle about 90 horsepower in motors, while the 500,000 cir. mil circuits carry about 160 horsepower.

NO TIME LOST

Although the plant has more than a million square feet of floor area, and contains thousands of power-driven machines, careful planning made it possible to change over to the new distribution system without any loss of production time.

The procedure was to sectionalize the plant and treat each section as an individual change-over job. As the new lateral circuits were installed and the machines connected to them, they were fed temporarily from the old panelboxes. As the load centers were completed the laterals were then connected to them. By making the change-over in this way entire groups of machinery and equipment were maintained in continuous operation.

The entire power load is now on one meter, which is located in the main 12,000-volt substation. With only one demand meter in place of the many that were previously used, power costs will be considerably reduced. In addition, elimination of the many meters used before will show a considerable saving in monthly rental costs.

This is the best thinking I've seen on the problems labor's leaders are forcing on the nation—Dr. Slichter clearly outlines the grounds on which the American people must make up their minds about unions.

L. C. MORROW

WHAT TO DO ABOUT THE LABOR MESS

SUMNER H. SLICHTER • LAMONT UNIVERSITY PROFESSOR, HARVARD UNIVERSITY

Behind Sumner H. Slichter's penetrating analysis of the problems "big" labor brings the nation is a lifetime study of economic and industrial problems. He is widely known in industry as chairman of the "Slichter Blue Ribbon Panel," a special panel appointed by the War Labor Board to study foremen's unions in 1944, and for his leadership in economic research.

Born in Madison, Wis., Dr. Slichter was educated at the University of Munich, the University of Wisconsin, and the University of Chicago. He served on the faculties of Princeton, Cornell, and Harvard and on the staff of Brookings Institution. Since 1940, he has been Lamont University Professor at Harvard. He has also served as president of the American Economic Association, and is now an economist for the Committee for Economic Development and chairman of its advisory board.

1 • Big unions' power threatens nation

More plants in the United States have good relations with trade unions today than at any time in the country's history. This important fact should not be overlooked as the community struggles this winter to solve the most difficult labor problems that have ever confronted it. These problems exist because during the last thirteen years there has arisen in the community a great new power, *organized labor,* which the community has not yet learned how to control.

In less than fifteen years union membership has increased from less than 3,000,000 to over 15,000,000. Today the labor movement in the United States is the largest, the most powerful, and the most aggressive that the world has ever seen. The aggressiveness of unions has been stimulated by keen rivalries between unions and between union leaders. During the last few years, and especially during the last twelve months, unions have used their great power in five principal ways which have created problems for the community:

1 **They have put strong upward pressure on wages, and under the circumstances, indirect pressure on prices at a time when demand for goods was outrunning supply and when the country was threatened with runaway inflation.**

2 **They have struck for the purpose of compelling employers to violate the law.**

3 **They have struck for the purpose of compelling the government to change its policies or to force changes in the decisions of administrative officers or courts.**

4 **They have struck or engaged in boycotts for the purpose of controlling the union affiliation of workers and to force workers to shift from the union of their choice to another union.**

5 **They have cut off the country from essential goods and services such as railroad transportation, steel, or coal, and have cut off cities from light and electricity. Some unions of government employees have claimed the right to strike even if by so doing they halt the processes of government.**

Until these basic problems of the relations of unions to the community have been solved, labor conditions in the United States will not be stable. A clear definition of the duties and rights of unions and of the rights of the public is needed. So also are effective ways of implementing public policy and of making plain to both the public and the unions that the government will be a government, not the pliant servant of highly organized groups.

II • These problems now confront us

Let us look more closely at these five problems:

1 Aggravation of the danger of inflation by the upward pressure of unions on wages. Demands of unions for higher wages have been particularly strong this last year for several reasons. One reason is that unions were encouraged to make such demands by representatives of government, including the President himself. Another reason is that unions were severely limited during the war in the wage increases they might seek. With the restoration of partial freedom to bargain, unions naturally wished to put their unused bargaining power to use. In many cases they were stimulated to do so by the loss of overtime earnings. Most important of all, of course, was the existence of a strong sellers' market which gave the unions a golden opportunity to drive favorable bargains.

Does the experience of the last year indicate that, whenever the country experiences a strong sellers' market, the great bargaining power of unions will aggravate the danger of runaway prices? Whenever it is easy for employers to pass on wage increases to consumers in the form of higher prices, it will be easy for unions to get wage increases. But the very success of employers in raising prices and the cost of living will lead unions to ask further wage increases. *This seems to indicate that the great strength of unions contributes during periods of boom to the danger of runaway prices.*

As the boom proceeds, employers eventually find it difficult to raise prices. One reason is that the deferred demand, which accumulated while business was slack, is met. Another reason is that buying in anticipation of higher prices, important for a while, is limited in amount. Furthermore, union plants are only a part of the economy. As the boom develops, unions gradually force the wages of their members and the prices of their employers more and more out of line with the rest of the economy. In the near future the country may see a demonstration of what happens when unions use their great bargaining power to raise wages after employers are no longer able to pass on higher costs in the form of higher prices. *Just as the upward pressure on wages may accentuate the rise in prices during some phases of the boom, at later phases it may narrow profit margins, discourage plans for expansion, and initiate contraction.*

2 Strikes or boycotts for the purpose of compelling employers to violate the law. Fortunately these cases have not been numerous, but they occur now and then. Several years ago, the United Automobile Workers struck the Saginaw Foundry and several other plants of the Eaton Manufacturing Company in an attempt to compel the company to deal in the foundry with the UAW rather than the AFL, the duly authorized bargaining agent. AFL building unions in New Orleans refused to install materials delivered by CIO teamsters, although the National Labor Relations Board required the trucking companies to deal with the CIO teamsters.

Both of these cases represented attempts, one by a CIO union and the other by AFL unions, to compel employers to violate the Wagner Act. A strike for higher wages against the American News Company, Inc., was an attempt to compel the employer to grant wage increases that would have subjected him to criminal penalties under the wage stabilization law.

3 Strikes for the purpose of compelling changes in public policies or in the decisions of administrative officers. In substance, though perhaps not technically, the steel and meat packing strikes of last winter were for the purpose of forcing changes in the wage policy announced by the government in October, 1945. These strikes were settled by the government's changing its wage policy. The coal strike was a strike to compel a second change in the government's wage policy, and was settled by the government's agreeing that welfare funds were not to count as wage increases—although the government saw fit to pretend that no change in its wage policy was being made.

The seaman's strike of September was a strike to force a third change in the government's wage policy and was successful. In the spring of 1946 a strike of the New York subway workers was threatened in the event that the city sold a power plant to a private purchaser. In the Pittsburgh power strike in September a temporary injunction against a work stoppage was dissolved after the strikers had voted 4 to 1 against considering a company offer until the injunction was dissolved.

4 Strikes and boycotts for the purpose of controlling the union affiliation of workers. The growing rivalry between unions and union leaders and the lessening respect for established jurisdictional lines is causing a multitude of strikes and boycotts for the purpose of forcing men to change their membership or to punish men for joining the "wrong" union. The teamsters' union is waging open war upon the brewery workers' and will probably destroy it in nearly all places except several CIO strongholds such as Pittsburgh and Detroit.

The teamsters use the simple process of refusing to service breweries in which certain categories of workers or, in some cases, any workers belong to the brewery workers' union. In many instances AFL building trades unions refuse to handle CIO-made materials.

5 Interruption of essential services by strikes. For many years there had been a sort of unwritten law among the railroad unions that nationwide railroad strikes could not be called. During the last year, however, two of the railroad unions did what most unions had regarded as unthinkable—called nationwide railroad strike which virtually deprived all the country of railroad service. Furthermore the strike was called for a trivial reason—in order that the two unions might get a little more for themselves than had been awarded eighteen other unions by a board of arbitration and more than an award which had been given the two unions by an Emergency Board appointed by President Truman.

Until the last several years organization among electric light and

power employees has been too meager to make threats of strikes in this industry a serious problem. That day is now past. Organization among electric light and power employees is the rule rather than the exception. This means that in most large American cities the possibility of a general shutdown is real. During the last year it has occurred in several places, and it has almost occurred in several others. Furthermore it has occurred for trivial reasons. The Duquesne Light Company strike, which lasted nearly a month and threw about 100,000 nonstrikers out of work, came a few months after the men had gained a wage increase of 18 cents an hour. It also came after the rank and file had rejected arbitration.

During the last year the community has also learned that a few hundred thousand men are able to cut it off from coal and steel. This was not news as far as coal was concerned. Indeed, the country had got used to a coal strike about every other year. Furthermore, until recently, business concerns had carried large coal inventories so that coal strikes did not cause serious interruptions to production.

In 1945, however, the story was different, because coal inventories were abnormally small. Railroads had to curtail service and the steel industry cut its operations drastically from close to 90 percent of rated capacity at the end of March to 74 percent in the last week of April and to less than 45 percent at the end of May. A nationwide steel strike was almost a new experience. There had not been one since 1919. Now the country realizes that the flow of steel upon which scores of industries depend may be cut off at any time that the union's contracts expire.

III • Here is the action we can take

What action is demanded by these problems? The several problems are different and each of them requires tailor-made action. Let us look at them one by one:

1 The pressure of unions on wages during booms. Many people think that the ability of unions to put upward pressure on wages during booms should be weakened by changes in the Wagner Act which would tend to "equalize" the bargaining power of unions and employers. One suggestion is that the Act be amended to withhold from strikers the protection that the Act otherwise gives to employees. This would relieve employers from the obligation to rehire strikers without discrimination.

This proposal seems to me to be ill-advised. It would work a hardship upon the weakest unions which most need the protection of the Wagner Act. These are not the unions that threaten to create a spiral of rising wages and prices during booms. The proposal would hurt least the most powerful unions which set the pattern for wage increases in time of boom. One cannot imagine Lewis or Randolph of the International Typographical Union or Petrillo moderating his wage demands as a result of the proposed change. It is the reluctance of employers to incur strikes when business is good that determines the size of wage increases.

Another objection to a general amendment depriving all strikers of the protection of the Wagner Act is that this device would then be less useful as a method for dealing with certain types of strikes, such as strikes to compel violations of law or strikes in the essential services. The remedy should be conserved for use where it is most needed.

The problem of preventing a wage-price spiral is one that must be handled in the main by businessmen themselves. There is no single remedy. In some industries the bargaining power of employers would be increased by the organization of strong employers' associations with substantial treasuries and with rules that prevent members from making individual settlements.

The most important protection against price spirals must come from the buying policies of business concerns. If buying is based upon long-range planning, managements will pay more attention to the danger of being caught with high-priced inventories. Hence wage increases will stimulate less anticipatory buying; and employers themselves will have an interest in more strongly resisting the kind of wage demands that would contribute to a spiral of wage and price increases. Certainly the rise of collective bargaining requires a reconsideration of both buying and pricing policies on the part of business.

2 Strikes called for the purpose of compelling an employer to violate a law. No one either in the labor movement or out of it will defend such strikes. They are obviously illegal, and the strikers should lose their status as employees under the Wagner Act. The establishment of this rule should not be left to the judgment of the National Labor Relations Board or to the courts. It should be made plain by statute that men who engage in a concerted quitting of work for the purpose of compelling the employer to violate the law have terminated their employment. Rehiring them except as new employees should be made an unfair labor practice. This means that the strikers would have no opportunity to bargain over the restoration of seniority rights, vacation rights, or pension rights.

Observe that no prohibition is proposed on the men's quitting. That is their constitutional right of which they cannot be deprived. It should be made clear, however, that they cannot quit for the purpose of compelling the employer to violate a law without terminating their employment. Since the right to strike to compel a violation of law is not recognized, picketing and all other actions in support of the strike should be prohibited and penalized.

3 Strikes designed to coerce the government. These strikes should be regarded as serious attacks upon democratic institutions and democratic processes, because that is what they are. This conclusion holds regardless of the merits of the issues. No one will claim that the government never makes mistakes or that it never seeks to enforce policies which work hardships upon members of the community including workers.

The fact that a group of workmen, however, have a just grievance against a government policy or against the decisions of an administrative agency does not justify their striking to compel changes in government policies. *All* members of the community are exposed to the same danger of being unjustly treated by this or that government policy. Workers are exposed to no special hazards. No group of citizens, however, whether employers, bankers, farmers, or workers, should enjoy the right to combine for the purpose of forcing the government by economic pressure to change its policies or its administrative decisions. The railroads and the public utilities, for example, have long had to take whatever decisions or rates government commissions may hand down. They are not permitted to withhold their services in order to force the commissions to alter their decisions.

Workers who strike to coerce the government should be subject to the same disabilities as men who strike to compel an employer to violate the law— *they should lose their status as employees, and picketing, payment of strike benefits, and other actions in support of the strike should be penalized.*

4 Strikes and boycotts for the purpose of compelling workers to shift their affiliation from one union to another, or for the purpose of punishing men for joining the "wrong" union. This is a difficult problem. The general principle is clear, but the problem of implementing it has many complications. The underlying principle of the Wagner Act is that employees shall have the right to be represented by the union of their own choice. *The Wagner Act protects the principle of voluntary choice from interference on the part of employers. Are not workers entitled to the same protection when the source of economic coercion is a union rather than an employer?*

Why should unions have the special privilege of coercing non-member workers? If it is right that the men be given an opportunity to make a voluntary choice, the protection of the voluntary principle should extend to all coercion regardless of the source.

If coercion takes the form of a strike, the strike should be treated as illegal with all of the consequences of an illegal strike which have been outlined above. Coercion, however, may take the form of a refusal to handle materials made by members of the "wrong" union or to service establishments where members of the "wrong" union work. Certainly employers should be authorized to discharge men for this offense. This remedy, however, will not be sufficient. *Is it not a sound principle that men are permitted to combine for the purpose of dealing with employers, not for the purpose of controlling the decision of other workers?*

Boycotts to accomplish this result should be declared to be outside the legitimate purposes of trade unions, and should subject the union officers and union members to the penalties of the Sherman Act, just as would a combination among employers for the purpose of controlling the kind of goods which other enterprises have to buy.

5 Strikes which deprive the public of essential services. The public must make up its mind whether or not it wishes to give the right to strike to railroad workers, electric light and power employees, hospital employees, and various persons in the government charged with enforcing and administering laws. Perhaps the public prefers to suffer occasional shutdowns of railroad service or stoppages of electric light and power service or even stoppages of essential government functions rather than to deprive the men who perform these services of the right to strike.

If that turns out to be the considered decision of a majority of the community, the majority is entitled to have its way. If the public gives men in essential services the right to strike, however, the public is not in a position to complain if men use the rights that the public has given them. Rights are given to be used. Nor should the public expect strikes among strategically situated employees to be prevented by unwritten understandings or customs that men in certain occupations will not strike on a large scale. Such unwritten "laws" have already broken down. Furthermore, the public should not expect the holders of great power to use it with moderation and restraint. History shows that great power goes to men's heads, and that it is likely to be abused. The public must not assume that trade union members and trade union leaders are different from the rest of humanity—that they will be more moderate in the use of great power than have been priests, nobles, and business men.

The public should face squarely what a shutdown of electric light and power would mean in a large city in midwinter. Thousands of houses, many of them belonging to union business agents and union members, would be cold because oil burners do not run without electricity. Many factories and stores which depend for their operation upon electricity would close. Elevators would not run, and unless transportation systems had their own source of power, streetcars and subways would not operate. The effects of a prolonged railroad strike would be equally disastrous.

Let me repeat that restrictions on the right to strike do not prevent men from ceasing work. Such restrictions simply mean that the cessation of work produces a termination of employment. Nor do restrictions on striking prevent the employer from rehiring men who have quit. They simply mean that the men must come back as new employees. It is important that this condition be made definite and that employers be given no discretion to bargain with the men over the restoration of the seniority rights, vacation rights, or pension rights which they lost by quitting.

If the public decides that special obligations shall be imposed upon employees in certain occupations, the public should also give these men special rights. A program which is merely negative cannot be expected to work. In particular the men in essential services should be assured of an annual review of their wages, with assurance that their wages will be raised by whatever amount wages in general go up. Likewise, they should be assured of a review of their working conditions before impartial tribunals and they should receive pensions and vacation rights more liberal than those usually found in industry.

CONTINUED ON NEXT PAGE

What about strikes of coal miners and steel workers? The community is not immediately dependent upon the output of coal and steel because several weeks' supply is usually on hand, but a long shutdown in either of these industries could be a national disaster. In 1927, the bituminous coal strike lasted six months. The nation did not suffer from lack of coal because over half of the industry was non-union. Today a coal strike of six months would be a great calamity.

Is the public prepared to take away from the coal miners and the steel workers the right to strike? If not, is the public prepared to endure prolonged shutdowns in these industries every now and then? The public cannot escape deciding these questions. The men in these industries now have the right to strike. Hence, if the public does nothing, it is deciding that it prefers to accept the cost of occasional lengthy shutdowns in order to give the coal miners and the steel workers the right to strike.

One thing the public must not do —it must not give men the right to strike on the assumption that the right will not be used. As I have said above, the public is not justified in finding fault with men for using the rights which the public gives them. Nor is it realistic for the public to assume that both sides will always be reasonable and that long strikes or lockouts will never occur.

Perhaps the public will prefer to rely on users of coal and steel to carry large inventories of coal and steel and thus to protect themselves and the public against all but very prolonged strikes in these industries. If a strike or lockout of miners or steel workers lasts long enough to cripple industry in general, the government should be provided with a predetermined way of dealing with the problem. The United States Conciliation Service should maintain a standing panel of experienced and impartial arbitrators. No man should be eligible for inclusion in the standing panel unless approved by a joint labor-management advisory committee which supervises the work of the conciliation service.

If the head of the conciliation service believes that a strike or lockout is imperiling the public health, the public safety, or the general welfare, he shall appoint an emergency board from his standing panel, not to investigate the merits of the dispute, but rather to determine the effect of the dispute upon the community.

If the panel finds that the public health, the public safety, or the general welfare would be gravely menaced by a continuation of the shutdown, the panel shall order the union to return its men to work, or, in the case of a lockout, the employers to open up their plants. If the panel finds after proper hearing that any union officers have failed in good faith to make a reasonable effort to induce the men to return to work, it shall certify this finding to the National Labor Relations Board. Such officers shall be ineligible to hold office in any union subject to the Wagner Act, and it shall be an unfair labor practice for any such union to keep them in its employ. A union that fails to discipline members who disobey its back-to-work orders may be required to show cause before the NLRB as to why it should not be deprived of bargaining rights in the plants affected.

Men who decline to return to work shall be held to have terminated their employment, and it shall be unfair labor practice for employers to rehire them except as new employees. Work shall be resumed under the terms of the old contract, pending determination of the dispute by a board of arbitration. The findings of the board shall be retroactive to the date of resuming work, but shall not be binding on the parties for more than six months. This is short enough not to be burdensome and long enough to give them a reasonable chance to negotiate a contract more to their liking. The proposed procedure keeps the President and other political officials out of the picture, and it works through the union, giving it a chance to end a strike which has been found to threaten the public welfare.

IV • It's up to the people to decide

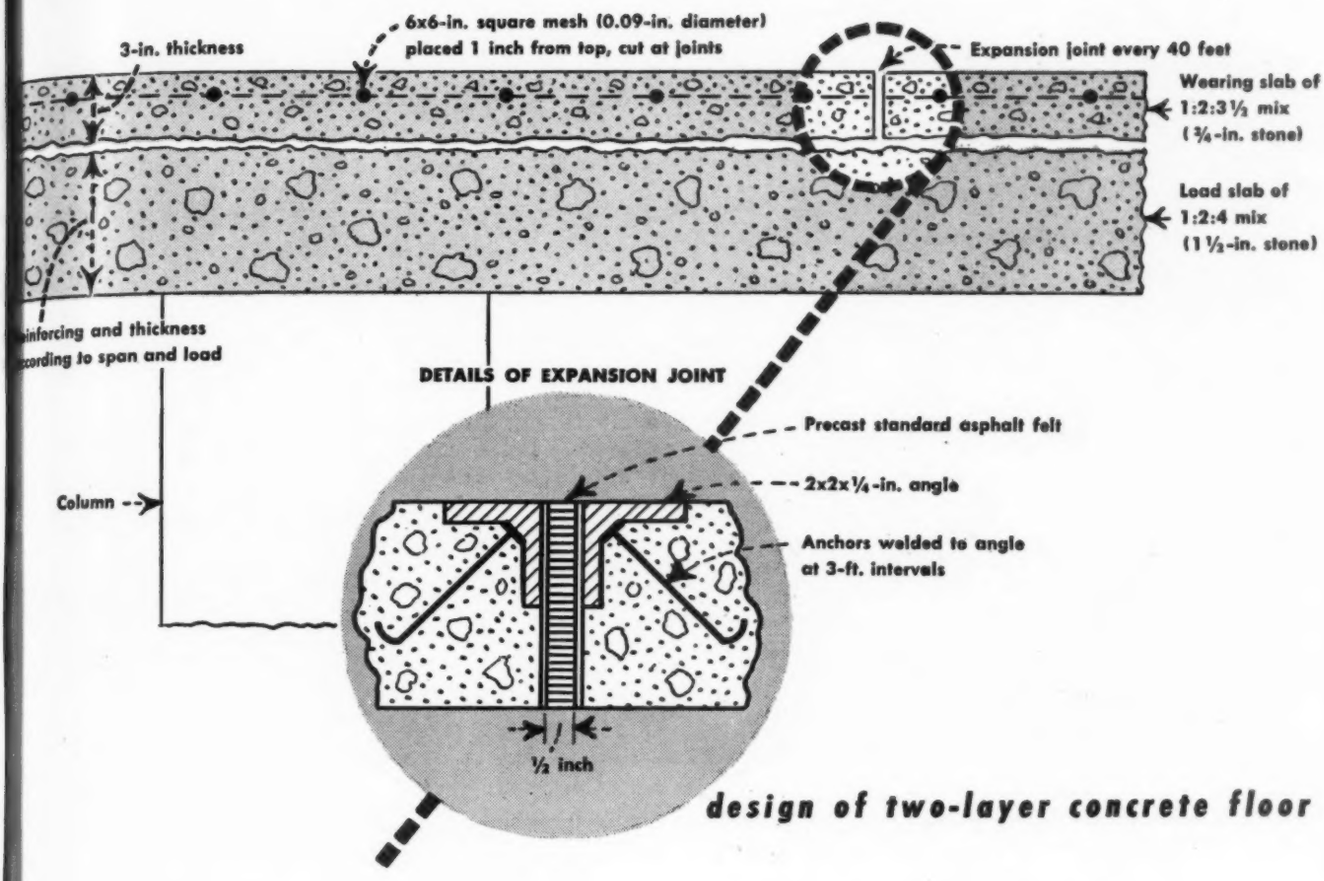
So rapid has been the rise of trade unions that the country is grievously unprepared to deal with the problems they have created—unprepared intellectually and unprepared emotionally. The country has not had time to learn what the problems are or to think about them. Furthermore, it has not had time to adjust its attitudes toward unions to the new facts of life. Thousands of people still regard all unions as underdogs. Some unions are, but others are the most powerful economic organizations which the country has ever seen.

Two great dangers confront us. One is that the present bewilderment and confusion of the public will give labor baiters a chance to get legislation passed which interferes with the proper and effective functioning of trade unions. The other is that public policy will be unduly influenced by wishy-washy "do gooders" who believe that the mistakes of unions should be regarded simply as the mistakes of spoiled children.

Neither the solutions of the labor baiters nor the solutions of the impractical "do gooders" will produce a stable labor situation. A lasting and satisfactory solution will recognize the contribution which trade unions have made and are capable of making to better working conditions, and will also recognize the need of protecting both the general public and individual workers against the abuse of power by unions.

DEFINITION NEEDED

A clear and fair definition of the duties and rights of unions is needed by trade unions and their members as much as by the rest of the community. Trade unions need to know where they stand with the community, what the public expects of them, and what duties the public thinks should be imposed upon them. Trade unions as well as the public need to have public policies toward unions effectively enforced. Otherwise a few irresponsible and power-greedy labor leaders may imperil the rights of all labor.



design of two-layer concrete floor

HERE'S A FLOOR FOR SEVERE SERVICE

FRED LEOPOLD • CHIEF ENGINEER, LEE RUBBER & TIRE CORPORATION
CONSHOHOCKEN, PA.

A two-layer concrete floor has been adopted as standard for all production areas by Lee of Conshohocken. Designed principally for resistance to the crushing effect of the heavy loads (averaging 2500 pounds) of the four-wheeled trucks used for transporting most of the work in process, the floor has successfully withstood the impact and abrasive wear of the truck casters.

The original sections, installed about 3 years ago, still appear in unblemished condition, and are expected to give 5 to 7 more years of service. And replacement will be a minor problem, because the two-layer design permits any portion of the floor to be broken and removed.

Some 300,000 square feet, half of the production area of the plant, are already surfaced with this standard floor; the same design will be used in all remaining production areas as replacement of present floors is required.

Design specifications of the two-layer floor are given in the accompanying cross-sectional view. Other important details to be observed during construction to insure best service are:

Keep mix as low in water-to-cement ratio as possible, and use a moisture inhibitor on top slab after setting to get a proper water combination.

Pour wearing slab within 24 hours after pouring load slab, to obtain a slight adhesion, but not a bond. Give top surface of the wearing slab a smooth trowel surface.

An integral iron hardener, dusted onto the surface before final troweling and worked in with a mechanical float, will improve the wearing quality. A ratio of 1.0 or even 1.2 pounds per square foot has been found to give best results.

Use steel angle corners at expansion joints; they have eliminated the complaint of chipping and rutting unprotected joints by the heavy truck wheels. Practice is to assemble the expansion joint filler with the angles before laying. The assembly is held together with ½-in. bolts spaced 6 to 8 feet apart.

In the adoption of this floor design as a standard for its production areas, Lee feels that it has eliminated one of its major maintenance headaches.

The author tells a group of new employees about safety. Westinghouse Lamp Division finds that the 45 minutes devoted to these talks is time well spent—time that pays good dividends in a reduced accident rate as well as in better worker morale

SAFETY TALKS TO NEW WORKERS LOWER ACCIDENT RATES

WILLIAM D. RENNER • ASSISTANT SUPERVISOR OF SAFETY, LAMP DIVISION
WESTINGHOUSE ELECTRIC CORPORATION, BLOOMFIELD, N. J.

For a good demonstration of what safety education does to accidents, ask the Lamp Division. Here, over a 2-year period, the frequency rate for new workers has dropped from 6.85 to 2.87, and the division is sure that most of the 47 percent reduction may be attributed to its 45-min. induction program.

Accident prevention is the major aim of the program. A major part of it, therefore, is devoted to safety. A chart kept by the medical department of serious injuries to new employees is the "horror" exhibit. A tabulation showing that the number of accidents has been reduced from 22 per month to 3, is used to prove that recognizing the fact that a hazard exists, and then doing something about it, pays off.

Another benefit of the induction training program is the lift in new employee morale. Many new workers have been heard to say how nice it is to work for a company that takes the time to welcome its new employees and to explain basic policies.

The program extends through a 45-min. period which is broken down into (1) welcome, 5 minutes; (2) safety talk, 30 minutes; (3) suggestion system and other information, 10 minutes.

The welcome consists of a greeting, plus a few words to put the audience at ease. Then follows an introduction to the company's products. Employees are told how their work fits into the over-all picture of the completed product. Next follows a half-hour talk and discussion of safety and the accident problem. This talk is varied from time to time by making use of topical and seasonal subjects and events. For instance, on January 2, 1946, the New Year's holiday weekend accident toll, 437 people killed and many hundreds injured, was used as a talking point to drive home the need for safety in all things and at all times.

New accident experiences are utilized for their educational and corrective value. A blackboard is

Right from the beginning, the new worker is taught to look at and pay attention to the safety posters on bulletin boards

used to emphasize certain aspects of the talk and other visual aids, such as materials involved in accidents (defective tools, etc.), and safety equipment, are called into play for their dramatic value. Throughout the talk, the personal, human factor in accidents is emphasized, along with a strong plea for the elimination of unsafe attitudes and work habits. Everyone is invited to participate in the plant safety effort and to act as a safety committee of one in his own behalf.

The suggestion system also is explained, and everyone is invited to use it, particularly as a medium for effecting safer work conditions and increasing earnings.

Noticeably good results from the program have been observed by the suggestion department. An appreciable increase in the number of new suggestors was noted after the induction training program had been established awhile. This increase was attributed to the information given on the plant suggestion system to all new employees.

An induction training program is indeed an investment—a necessary one—and if properly conducted will bring results that will more than justify its existence.

OUTLINE OF SAFETY SESSION

INTRODUCTION
- A. Greeting
- B. Safety is a broad subject
  - 1. Safety at home — your business
  - 2. Safety abroad — your business
  - 3. Safety at work — a. your business; b. our business

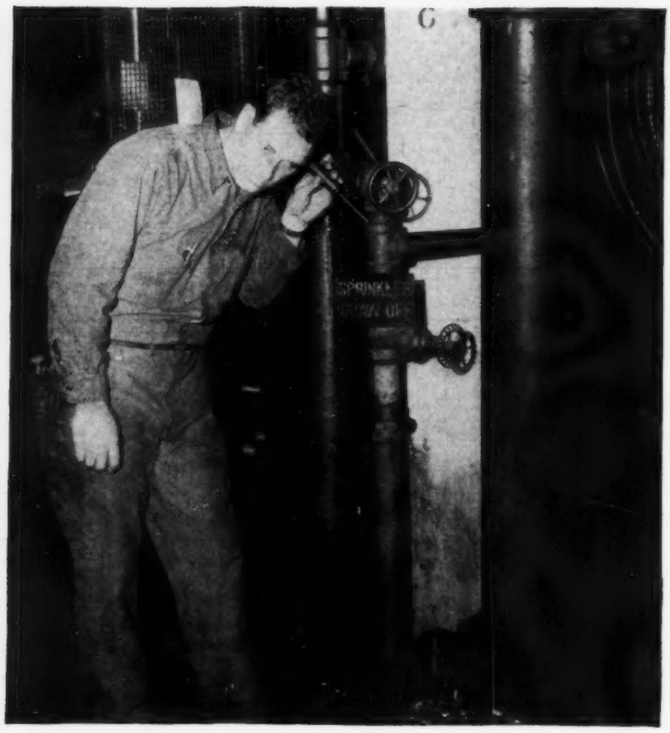
WHY WE HAVE ORGANIZED SAFETY
- A. The accident saboteur
  - 1. Death toll — 1944, 95,000
  - 2. Injury toll — 1944, 9,600,000
    - a. Permanently disabled — 1944, 340,000
  - 3. 98 percent of above unnecessary —
    - a. Unsafe conditions — 10 percent
    - b. Unsafe habits and practices — 88 percent

HOW PLANT SAFETY PROGRAM WORKS
- A. Safety department — personnel
- B. Work of safety department
  - 1. Accident prevention and health preservation
  - 2. Maintenance of safe working conditions
  - 3. Keeping plant safety conscious —
    - a. Bulletin board posters and letters
    - b. Publications
    - c. Verbal instructions

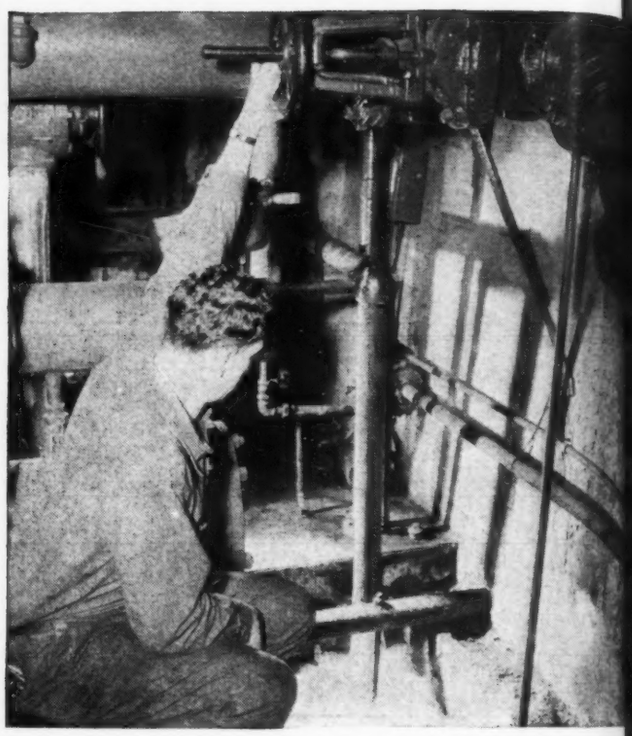
FIGHTING THE SABOTEUR
- A. Our obligation — remove accident causes
  - 1. Unsafe conditions
    - a. Engineering — maintenance and inspection
  - 2. Unsafe practices
    - a. Education and training
      - (1) Induction
      - (2) On-the-job safety instructions
      - (3) Special safety classes
- B. Your obligation
  - 1. Stop unsafe practices
    - a. Inattention
    - b. Deliberate chance taking
    - c. Personal apparel
    - d. Respect for machinery, electricity, fire, chemicals, etc.
  - 2. Wear safety equipment
    - a. Safety goggles, safety caps, gloves, respirators, etc.
  - 3. Cost of and care of safety equipment
- C. Special attention
  - 1. Clothing
    - a. How worn
    - b. Hair cover
    - c. Shoes
  - 2. Eye protection
    - a. Safety glasses
      - (1) Why needed
      - (2) Where needed
      - (3) How obtained
      - (4) How worn
  - 3. Running — horseplay — use of tools
  - 4. Safety books

FIRST AID
- A. All injuries treated
  - 1. When — at once
  - 2. Where — our medical department
  - 3. How — notify supervisor of injury
  - 4. Why — prevent serious consequences of infection
- B. Emergencies
  - 1. Stretchers — where located
  - 2. How to notify medical department
- C. Dermatitis
  - 1. Where and how contracted
  - 2. Frequent washing as most efficient preventive
  - 3. Protective clothing, barrier creams, etc.

SAFETY SUMMARY
- A. Why we have a safety department
  - 1. What it does — works for accident prevention
  - 2. Why — for your protection
- B. Your help is needed
  - 1. Why — human factor in most accidents
  - 2. How to help — work safely
- C. It brings results
  - 1. Safe workers in a safe plant
- D. Actions count. NOT promises



To check for a leaky valve in the sprinkler drain the inspector closes the drain and listens for water. Every valve in the National Cash Register system is tested this way twice a year



All sprinkler lines in the system are flushed at least every six months. Thus the company is dead sure that all the lines will be in working order in case they are needed in an emergency

WE MAKE SURE OUR SPRINKLERS ARE READY

E. D. SMITH • PLANT ENGINEER, NATIONAL CASH REGISTER COMPANY, DAYTON

Don't think for one minute that sprinkler systems require no maintenance. They do. And experience at the Dayton plant of National Cash Register Company provides a case in point. The facts are these. When some building changes were being made a few years ago, several sprinkler arms had to be removed—and when they were, they proved to be completely filled with foreign material.

Urgent need for a maintenance program was clearly evident—and the following inspection program was set up to insure trouble-free operation: **(1)** Check risers, flush city lines; (2) flush branch mains; **(3)** flush the sprinkler lines; **(4)** check sprinkler heads; **(5)** look for leaky drain valves.

All risers are checked to see that the indicator post valves shut easily and completely.

Regularly once each year the city lines are drained, and an experienced maintenance man listens at the base of the riser while another slowly opens the indicator post valve. Stones or other foreign substances that may be in the lines are agitated by the movement of the water and can be heard rattling against the pipe. Stones as large as 2 inches in diameter have been found in our water mains, and on one occasion a cold chisel was detected and removed.

To eliminate foreign material in the mains or branches, the sprinkler arms and the supply line are disconnected at the 2-in. coupling and temporarily connected to a 2½-in. hose. A burlap sack is placed over the end of the fire hose and the line is flushed. The residue caught in the sack shows what scale or other foreign matter may be in the system.

To prevent future accumulations of material in the sprinkler arm lines, flushing valves were installed at the outlet end of each arm. A garden hose is connected to the valve to carry the water and any

To make sure valves are open in risers from city lines, the inspector checks all indicator posts weekly. He then seals them open

Sprinkler heads must be checked now and then to guard against seepage and corrosion

accumulated material outside the building. This flushing is performed annually.

Sprinkler heads are checked for seepage to prevent premature opening. They are also checked for signs of deterioration or for creepage of the solder in the fusible links.

Drain valves on sprinkler systems are carefully checked for leaks. These are easily located by the pipe being colder than the room in which it is located. In fact, in a humid room the pipe may even sweat. A leaky condition is bad not only because it wastes water, but also because the fresh water introduced into the pipeline has a new supply of oxygen which rusts the inside.

Several other factors are kept in mind that have a direct bearing on the efficient operation of a sprinkler system.

The supply of water for the sprinkler system is obtained only from the regular fire lines, and these in turn are not used for service water lines.

After a fire, heads adjacent to those that opened are inspected for possible damage, and replaced if necessary.

In areas where there is heat producing apparatus, the maximum temperature at the heads is checked. If it is found to be within 50 degrees of the head rating, heads of higher temperature are installed. It is the duty of the maintenance or layout foreman to inform the plant protection department of any installations or removals of apparatus that may affect the temperature of any area and thus call for heads of either higher or lower temperature. In this type of equipment may be included steam unit heaters, ovens, furnaces, and pot heaters.

Indicator post valves are operated weekly, and are located in manholes, when possible, to permit greater ease of maintenance and repacking. The manhole is so constructed that the valve will not freeze.

THREE-WAY CONTROL FOR LOW-COST OPERATION

JOHN M. TASSIE • WORKS MANAGER, LENOX INCORPORATED, TRENTON, N. J.

Production control, quality control, and sales analyses with just two sets of punched cards. That's what a "card-machine" system is doing for Lenox Incorporated.

No subsidiary records are needed. The only paperwork required at any point is filling out the inspection reports, which are used as the basis of the quality control and lossage tabulations.

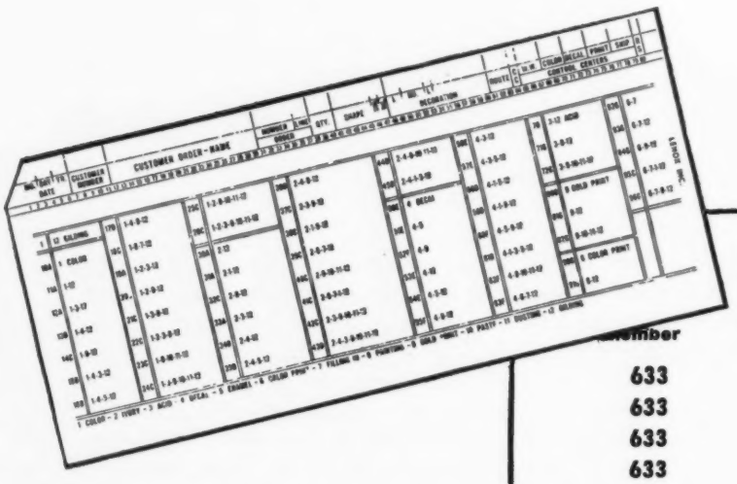
Briefly, here are the benefits management derives from the system in the three "fields" it serves.

PRODUCTION CONTROL

From the punched cards, complete tabulations are kept with respect to backlog. For production purposes, the factory is interested only in the shape of the piece and the decoration that is to go on it, and, of course, the total amount that is to be made. Hence, the whole backlog, or any segment of the backlog, may be pulled from the card files, sorted, and subsequently tabulated to give a complete report by shape number and decoration. Thus, the production control department will know just how many plates of any size are on order at any one time and just what decorations might go on plates of that size, so that production control can schedule the making of the proper number of plates to cover all orders. At the same time, the decorating division is provided with total amounts of the different patterns that are to go on those same shapes.

By making this breakdown and grouping, the factory is able to get the benefit of mass production, and schedules can be made out quarterly so that the factory can plan with respect to its personnel and facilities in advance of the actual production time. If this was not possible, and it was necessary to break down and analyze a backlog which consisted of 3500 different shapes and 4000 different patterns, chaos and confusion could easily take over and mass production could not possibly be carried on efficiently. Of course, the work could be done and the same end results could be accomplished by clerks, but it would probably take a staff nearly as big as the production group to organize the records.

By being able to combine and break down the backlog through production groups and units for any one quarter, many economies of manufacture naturally result. Analyses can be provided with re-



Cards are punched in duplicate from data on customer's order. One is for production control file; the other, sales

Analyses of current backlog may be made according to any of three "controls"—shape (as below), pattern number, or customer number. Breakdowns are possible in all combinations of these factors to aid planning

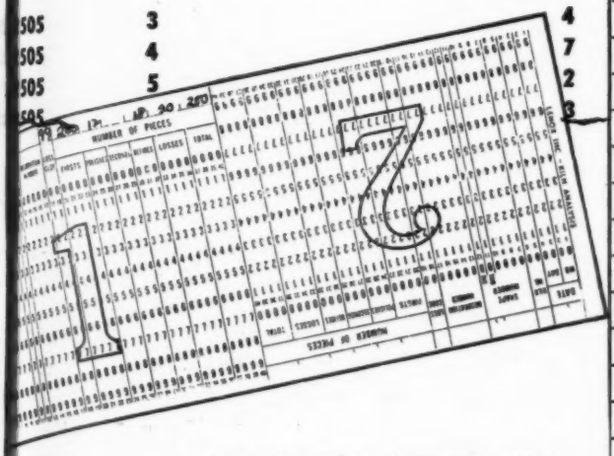
BACKLOG ANALYSIS

...mber	Decoration or pattern number	Quantity of shape by pattern	Total of shape for all patterns
633	86	2	
633	86&	6	
633	B346A	9	
633	D337A	3	
633	J 30	6	
633	J300	16	
633	P 67	48	
633	S 62	4	
633	Y 1	2	
			96
1019	86B	12	
1019	J 30	8	

Breakdown below shows losses by shape and then by class of loss. Second routine breakdown is class of loss by shapes. Many others possible by resetting tabulator

QUALITY CONTROL ANALYSIS

Shape number	Class of loss (coded)	Firsts	Polish	Refire	Quantity of loss in each class
427	2				4
427	99				4
		65	4	2	4*
505	3				4
505	4				7
505	5				2
505					3



Information from inspector's report (right) is punched into card, provides basis for analysis above

Rejections from each lot are listed by cause, with a separate code number for each cause. When figures are transferred to punched cards, totals are listed as "code number 99." (Figures shown on the report are hypothetical)

Reports similar to those shown above originate at this kiln, where decorative patterns are being baked on the finished plates

BISKET KILN REPORT

Selector's Clock No. Date 7/24 1946

Start Total Hours

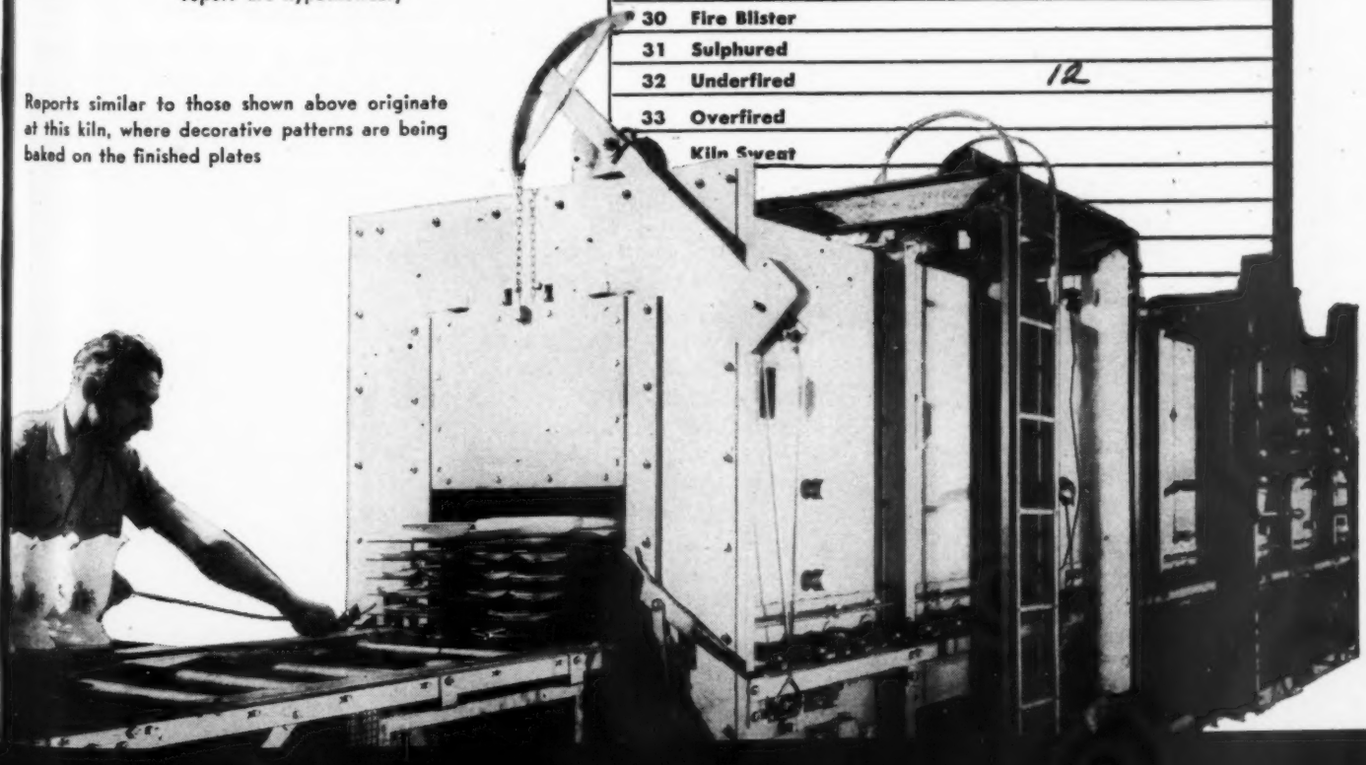
Stop

Hours

Kiln 25 Shape No. 1830

Form No. 36-A Deco. No.

LOSS CODE		Firsts	Pol	2nd	RF	Loss	Total
		200	12		18	20	250
1	Color Speck					2	
2	Speck						
3	Pin Holes					3	
4	Clay Cracks						
5	Dent					4	
6	Bad Edges						
7	Bad Finish		10				
8	Clay Blister						
9	Reeves						
10	Clay Chip					3	
11	Clay Mark		2				
12	Scurf						
13	Crooked — Hdl.						
14	Crooked — Ft.						
15	Chipped Ft.						
20	Crooked Rim				6 8		
21	Chipped						
22	Broken						
23	Split						
30	Fire Blister						
31	Sulphured						
32	Underfired				12		
33	Overfired						
	Kiln Sweat						



gard to backlogs in a matter of 24 to 48 hours and usually the analysis is of sufficient scope to be useful to factory management for at least 3 months, making it unnecessary to make the analysis more than three or four times a year. Shipments are tallied against the schedule, thus enabling management men to know at any time where they stand in respect to the current over-all schedule. By using the same system, the production control department can furnish delivery information after consulting the statistical analysis report.

Also, a very simple system of special order follow-up can be set up to take care of the numerous special requests that are constantly being received. The special request file or system ties right in with the master system so that it is handled automatically.

QUALITY CONTROL

The problem of following individual losses as far as each of the 3500 shapes is concerned was a task of such tremendous scope that it was never fully attempted under the old system. Consequently, individual costs on the various items were never properly and accurately established to the extent that is now possible. Reports under the old system were so voluminous and unwieldy that top management often did not take the time to study them as carefully as it would if they had been prepared in a concise tabular form.

Another complicating factor in quality control analysis was the fact that any one shape might possibly be affected by 32 different defects. It is now possible to get manufacturing lossage reports on each and every item complete with regard to the various types of losses. In other words, the percentage of losses on any one shape is broken down and tabulated for each one of the 32 possible defects. Then again, management desires to know what type of defects are most predominant for all shapes, regardless of their individual classification. The same tabulation is re-sorted, therefore, and the identity of each individual shape is dropped in the tabulation and only the classifications of losses are recorded, so that the final tabulation this time gives management a percentage analysis of the types of losses that constitute the total manufacturing shrinkage. This makes it possible for production people to concentrate their efforts along certain lines, since this type of analysis shows up the defects that are most common to all shapes. Hence, by working on a defect in this classification, they will automatically be making the correction on all shapes.

The quality control reports mentioned above are issued every two weeks and, if undue difficulties suddenly develop that management wants to follow closely, they can be prepared more often with little difficulty. The results of these bi-weekly reports are collected from month to month and curves are drawn, indicating trends, to give a quick visual picture. These same reports on quality are turned over to the cost accounting department which, in turn, records and distributes the individual loss percentages against each item in order that current manufacturing costing can be made continuous.

SALES ANALYSES

In addition to individual account analyses, top management can obtain broad analyses with respect to state and sales territorial conditions. It provides a fast way to obtain such information as, "What patterns sell the best in our states?" "What shapes in those patterns sell the best?" "How do these patterns sell nationally as against any one territory?" "What is the total backlog of any one group of patterns in any one territory against the total backlog of the same patterns in other territories?" "How much do these patterns represent of any particular territory's business five years ago *vs.* today?"

All such questions about sales can be readily answered by simply requesting the statistical bureau to prepare a tabulation with respect to whatever problem may be of interest at the time.

Now that these basic functions and some of their associate details have been described, the question may well be asked: "What is the system like that provides all this information?"

The "tools" or elements of the system are four machines—two card punching machines, one sorting machine, and one accounting tabulator.

A card which works commonly in all machines is prepared from customers' orders as they are received. On the cards is the following information—dates; customer's code number; quantity ordered; shape or part number; pattern or decoration number; price per dozen; extension discount; and net extension. As the key punch operator receives a customer's order, she punches holes in the cards by using a keyboard just as if she were typing the same information on a typewriter. The same information also appears printed across the top of the cards.

CARDS ARE THE KEY

The punching of the orders, of course, goes on daily and the cards are kept in big files. *These cards and their automatic sorting, interpretation, and filing* provide the key to all the information. In other words, by simply putting the cards through the machines and sorting them, almost any type of analysis or statistical report can be obtained.

The "system" consists, basically, of two main files. These files are fed by the cards that are punched from the incoming orders. Every order that comes in has two identical cards punched from it. Hence, it is possible to have two master files, and to have each of these files arranged in a different way to provide complete coverage of all information.

The cards in the production control file are filed by pattern number first and then subdivided by the shape number, so that the factory people can tell from this file what is on back order in a way that is most expedient for them and their factory planning. The sales file is set up first by customer number and subfiled by decoration number and then by order number.

As shipments are made, a clerk removes the tickets and the cards from both files. Consequently, both files represent at all times a continuous, accurate backlog record.

PHYSICALLY FITTING MAN TO JOB

GUY E. FINOUT • PERSONNEL DIRECTOR, CHEVROLET MOTOR DIVISION
GENERAL MOTORS CORPORATION, TONAWANDA, N. Y.

An effective method of protecting employees from job requirements for which they are physically unsuited is in use at the Chevrolet Tonawanda plant.

When a supervisor needs a new employee, he prepares an employment requisition. This form lists the usual details for the accounting department, and includes a checklist of physical requirements.

It is to be noted here that the foreman is the originator of the requisition, and the fact that he is the part of management being served in the hire of a new employee, it is his right to accept a worker or reject one he considers unsuitable.

The requisition has to be approved by the plant manager. Then the employment manager interviews applicants. A prospective employee who meets the occupation requirements is sent to the medical department with a physical examination request form.

HOURLY RATE

EMPLOYMENT REQUISITION

NO._____

DEPARTMENT NO._____ SHIFT_____ DATE_____

EMPLOYMENT DEPARTMENT IS AUTHORIZED TO HIRE ONE PERSON AS DESCRIBED BELOW

OCCUPATION	PART NO.	OPER. NO.	RATE	CHECK THESE ITEMS	
				MALE	
				FEMALE	
				INCREASE	
JOB CHARACTERISTICS—CHECK THOSE APPLYING				REPLACEMENT	
				TEMPORARY	
				PERMANENT	
				EXPERIENCED	
				INEXPERIENCED	
				TOOLS	

STANDING	SITTING	WALKING	CLIMBING	HEAVY	MEDIUM	LIGHT	FAST	OILY	FUMES	ACID	DUSTY	NOISY	HOT	NO. OF MCHS. OPERATED	USES 1-2 HANDS	USES BOTH HANDS & FEET	LIFTING TO WAIST	LIFTING ABOVE WAIST	REACHING OVER HEAD	SAFETY DEVICES REQUIRED	HOURS TO
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	

REMARKS_____

FOREMAN_____ APPROVED_____ APPROVED_____

When a foreman needs a new worker he first makes out a requisition that shows, in addition to accounting department details, physical requirements of job to be filled

REQUEST FOR PHYSICAL EXAMINATION

DATE_____

NAME_____

HAS BEEN SELECTED, SUBJECT TC PHYSICAL EXAMINATION, FOR A POSITION AT THIS PLANT. KINDLY ADVISE YOUR RECOMMENDATIONS.

_____ EMP. MGR.

MEDICAL RECOMMENDATIONS:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

_____ M.D.

The examining doctor checks classifications that correspond by number to the list of job characteristics on the requisition. An *X* signifies approval; *0* indicates a negative report. The employment manager hires the applicant whose physical qualifications match the employment requisition, subject to final approval by the foreman

CHECKED BY DOCTOR

A doctor makes an examination and fills in all numbered blocks on the form. An *X* signifies approval; *0* indicates a negative report.

The employment manager matches the physical report with the employment requisition form. If a cipher appears for any classification marked essential to the work, the applicant is not considered eligible for that particular job. On the other hand, when physical qualifications match job requirements, both employer and employee benefit from the care used in making sure that the best possible selection has been made.

The control established in the proper selection of new employees is extended to the matter of transfers. The usual transfer form, after approval by the foreman and division superintendent, is referred to the medical department, where a doctor reviews the transferee's original examination and recent medical history. In the event of any question as to the advisability of approving the transfer, further investigation is made to determine the proper recommendation.

The foreman not only requires an employee who is physically fit for the job to be done, but the new employee must also satisfy his supervisor in effort, quality of work, attendance, safety, cooperation, personal habits, etc. Should the new employee not be satisfactory, the supervisor will return him to the employment department, where another trial is worked out for him.

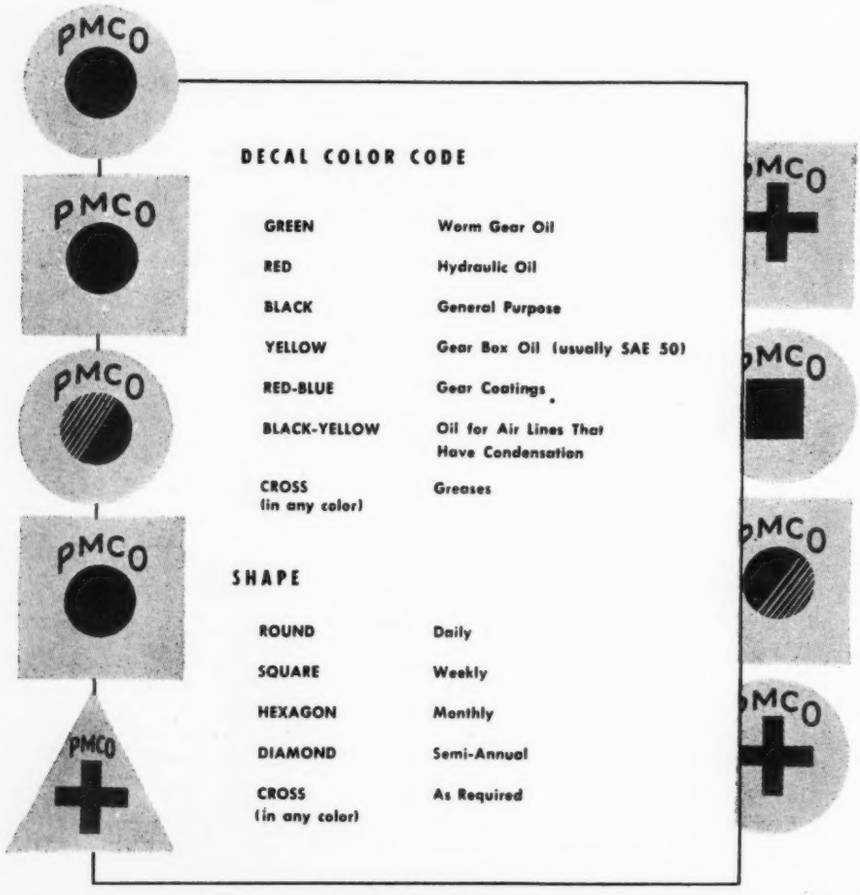
45,000 LUBRICATION POINTS SERVICED ON TIME SCHEDULE

K. D. HARTMAN • LUBRICATION ENGINEER, PETTIBONE MULLIKEN CORPORATION CHICAGO

Problem—to insure positive lubrication for 1500 machines, 3000 motors, and 45 lift trucks. Solution—the sure-fire lubrication schedules described in this article

Lubrication for 45,000 lubrication points. Reduced to absolute routine. On a timetable schedule. With no miss and no overlap. These are but a few of the advantages of the plan put into operation at Pettibone Mulliken Corporation. The plan is based on (1) detailed lubrication charts, (2) master files, (3) oil service cards designed specifically for on-the-job use, (4) forms for special lubrication problems. These records and forms are adapted to cover the lubrication details for 1500 machines, 3000 motors, and 45 lift trucks.

In addition to the guidance provided by the records, decalcomanias are used to mark machines so that workmen will know when and where to service lubrication points, and what kind of oil or grease to use. Less experienced workmen can do the job because the necessary skill and knowledge to guide workers has been planned into the system.



Decals on equipment and supplies assure the use of the right lubricant in the right place. Color shows type of lubricant to use; pattern tells how often to use it

LUBRICATION CHARTS

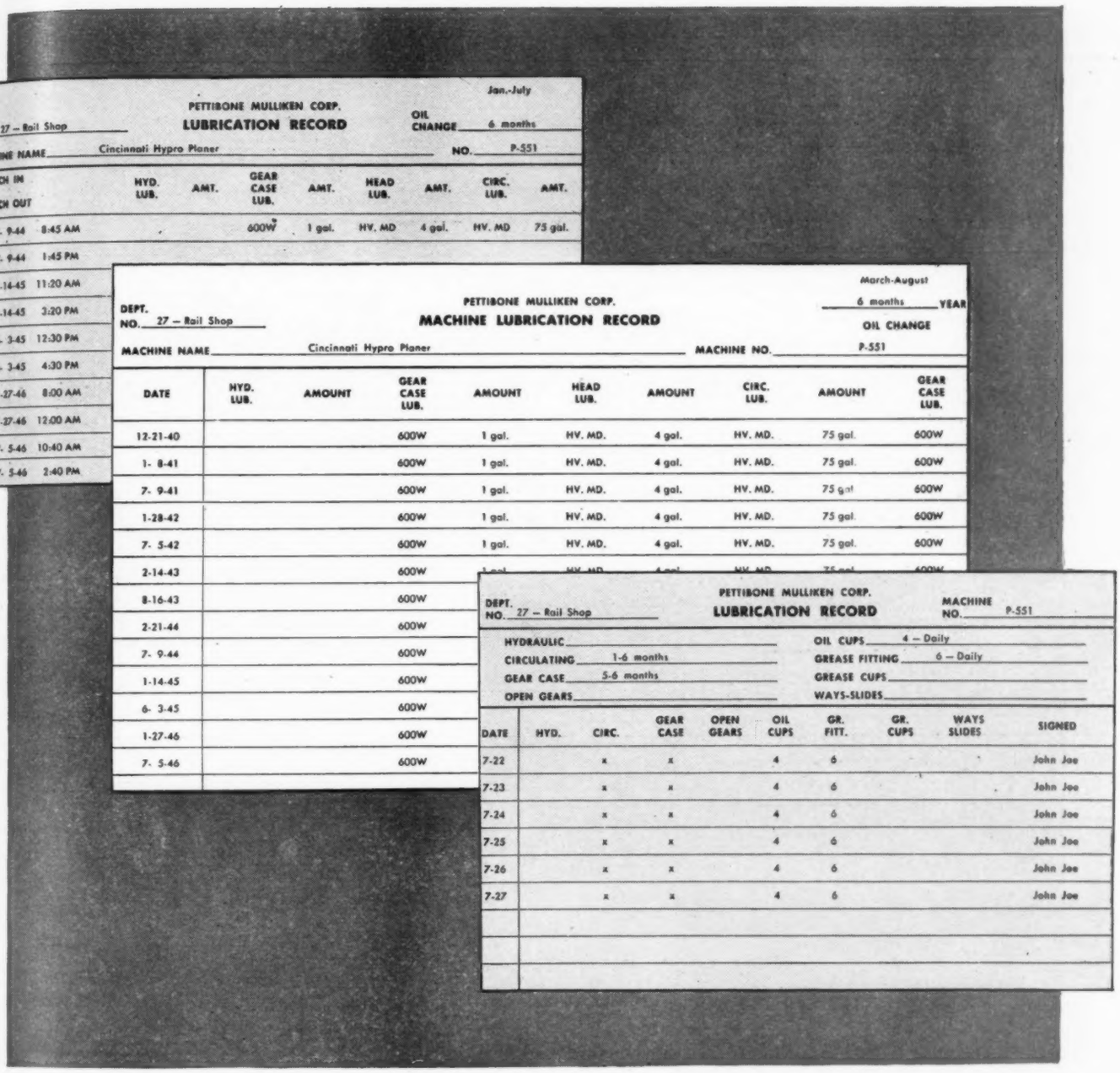
The company's first step in organizing the plan was to develop lubrication charts for each machine and piece of equipment. The information placed on these charts was obtained in most instances from the machinery manufacturers through service manuals, machine instruction plates, and standard instructions that usually accompany each new machine. A letter written to the manufacturer brought the additional information needed for some charts.

In order to standardize the line of lubricants, manufacturers' specifications were not adhered to strictly. Recommendations regarding viscosity, brand names, and grades of oil and greases were compromised on to make the system practical yet simple.

While this work was in progress, a thorough study was made of all lubricants in stock. From this study alone, the number of oils carried was reduced approximately one half.

LUBRICATION RECORDS

Master machine cards. Master machine lubrication cards are kept on file at all times in the maintenance department office. Information recorded is department number; machine make; machine number; number of points to be lubricated daily, weekly, monthly,



PETTIBONE MULLIKEN CORP.
LUBRICATION RECORD

DEPT. NO. 27 – Rail Shop
MACHINE NAME Cincinnati Hypro Planer
OIL CHANGE Jan.-July 6 months
NO. P-551

PUNCH IN / PUNCH OUT	HYD. LUB.	AMT.	GEAR CASE LUB.	AMT.	HEAD LUB.	AMT.	CIRC. LUB.	AMT.
7- 9-44 8:45 AM			600W	1 gal.	HV. MD	4 gal.	HV. MD	75 gal.
7- 9-44 1:45 PM								
1-14-45 11:20 AM								
1-14-45 3:20 PM								
6- 3-45 12:30 PM								
6- 3-45 4:30 PM								
1-27-46 8:00 AM								
1-27-46 12:00 AM								
7- 5-46 10:40 AM								
7- 5-46 2:40 PM								

PETTIBONE MULLIKEN CORP.
MACHINE LUBRICATION RECORD

DEPT. NO. 27 – Rail Shop
MACHINE NAME Cincinnati Hypro Planer
OIL CHANGE March-August 6 months YEAR
MACHINE NO. P-551

DATE	HYD. LUB.	AMOUNT	GEAR CASE LUB.	AMOUNT	HEAD LUB.	AMOUNT	CIRC. LUB.	AMOUNT	GEAR CASE LUB.
12-21-40			600W	1 gal.	HV. MD.	4 gal.	HV. MD.	75 gal.	600W
1- 8-41			600W	1 gal.	HV. MD.	4 gal.	HV. MD.	75 gal.	600W
7- 9-41			600W	1 gal.	HV. MD.	4 gal.	HV. MD.	75 gal.	600W
1-28-42			600W	1 gal.	HV. MD.	4 gal.	HV. MD.	75 gal.	600W
7- 5-42			600W	1 gal.	HV. MD.	4 gal.	HV. MD.	75 gal.	600W
2-14-43			600W						
8-16-43			600W						
2-21-44			600W						
7- 9-44			600W						
1-14-45			600W						
6- 3-45			600W						
1-27-46			600W						
7- 5-46			600W						

PETTIBONE MULLIKEN CORP.
LUBRICATION RECORD

DEPT. NO. 27 – Rail Shop
MACHINE NO. P-551

HYDRAULIC
CIRCULATING 1-6 months
GEAR CASE 5-6 months
OPEN GEARS
OIL CUPS 4 – Daily
GREASE FITTING 6 – Daily
GREASE CUPS
WAYS-SLIDES

DATE	HYD.	CIRC.	GEAR CASE	OPEN GEARS	OIL CUPS	GR. FITT.	GR. CUPS	WAYS SLIDES	SIGNED
7-22		x	x		4	6			John Joe
7-23		x	x		4	6			John Joe
7-24		x	x		4	6			John Joe
7-25		x	x		4	6			John Joe
7-26		x	x		4	6			John Joe
7-27		x	x		4	6			John Joe

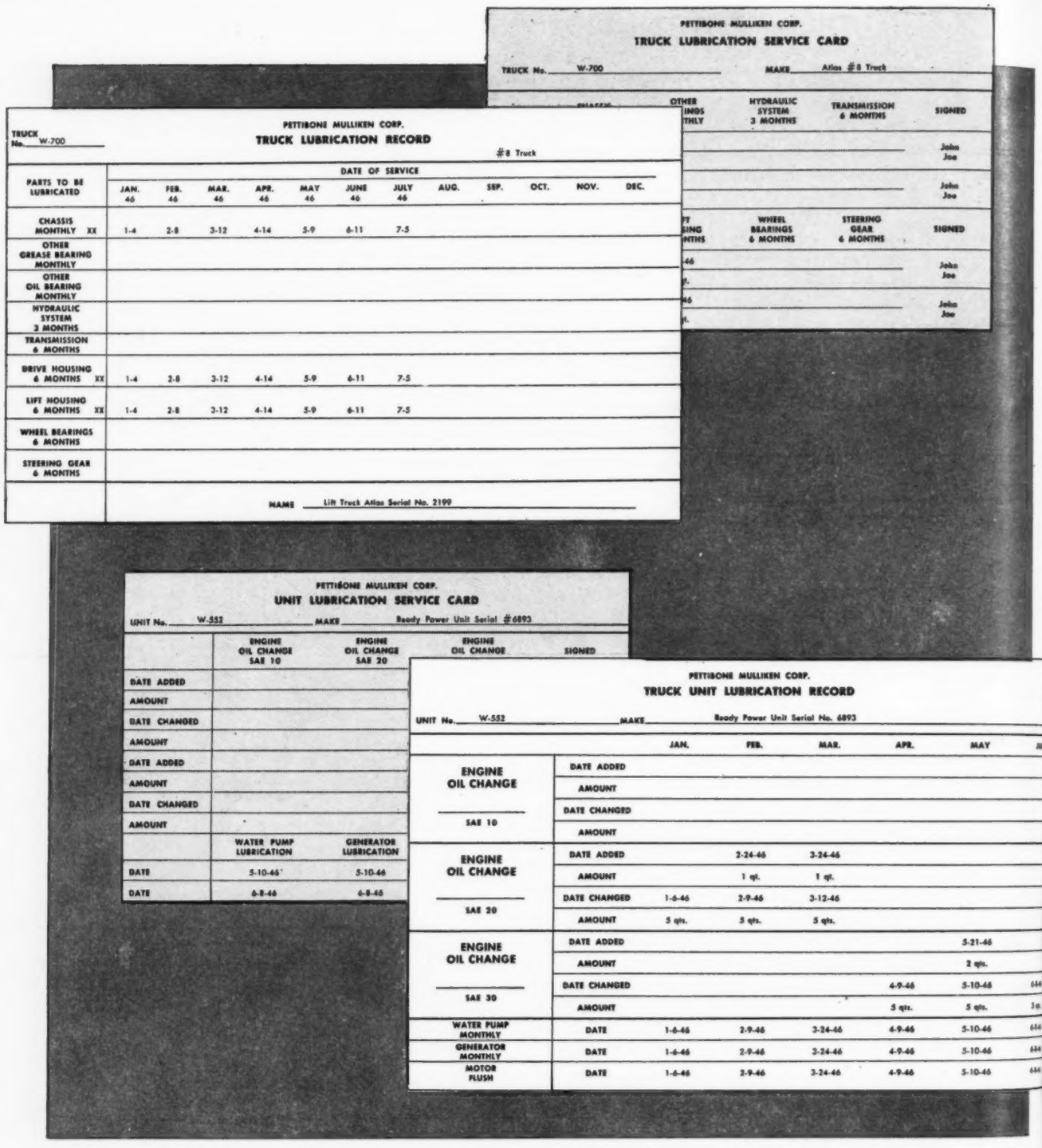
Oil service card (top) and daily lubrication card (bottom) are on-the-job forms. They are carried by the worker in cellophane jackets on a steel ring. On a lubrication route, they tell worker exactly when to use what lubricant and how much. These working forms are based on a master lubrication record (center) which lists basic data and work schedules for all machines and motors in the plant

semi-yearly, or yearly; number of gear cases, hydraulic systems, and circulating systems; and the type of lubricant to be used.

Oil service cards. Once a week a number of oil change service cards are removed from the office master files and given to the crew chief. These cards give the lubrication men complete information—where to lubricate, what lubricant to use, the amount, and the date the oil should be changed. The crew chief assigns a number of oil change service cards to each of his men. Cards must be punched "in" and "out" on every machine that requires draining. After an oil change is completed the cards are forwarded to the main files and advanced to the date when the oil must be changed again. Oil changes are made in all reservoirs in periods varying from 6 to 12 months. Meanwhile, all data are taken from the oil service card and recorded on the master cards.

Daily lubrication service card. Each lubrication man has one of these cards for each machine he lubricates. He carries the cards on a steel ring, similar to the ring used by paper boys, with each card encased in a cellophane cover. When the cards are not being used by the worker, they are kept in the maintenance department office and are arranged by department on a master board.

Clerical workers record information from these service cards on the



PETTIBONE MULLIKEN CORP.
TRUCK LUBRICATION SERVICE CARD

TRUCK No. W-700 MAKE Atlas #8 Truck

	OTHER	HYDRAULIC SYSTEM 3 MONTHS	TRANSMISSION 6 MONTHS	SIGNED
				John Joe
				John Joe

	WHEEL BEARINGS 6 MONTHS	STEERING GEAR 6 MONTHS	SIGNED
			John Joe
			John Joe

PETTIBONE MULLIKEN CORP.
TRUCK LUBRICATION RECORD

TRUCK No. W-700 #8 Truck

PARTS TO BE LUBRICATED	DATE OF SERVICE JAN. 46	FEB. 46	MAR. 46	APR. 46	MAY 46	JUNE 46	JULY 46	AUG.	SEP.	OCT.	NOV.	DEC.
CHASSIS MONTHLY XX	1-4	2-8	3-12	4-14	5-9	6-11	7-5					
OTHER GREASE BEARING MONTHLY												
OTHER OIL BEARING MONTHLY												
HYDRAULIC SYSTEM 3 MONTHS												
TRANSMISSION 6 MONTHS												
DRIVE HOUSING 6 MONTHS XX	1-4	2-8	3-12	4-14	5-9	6-11	7-5					
LIFT HOUSING 6 MONTHS XX	1-4	2-8	3-12	4-14	5-9	6-11	7-5					
WHEEL BEARINGS 6 MONTHS												
STEERING GEAR 6 MONTHS												

NAME Lift Truck Atlas Serial No. 2199

PETTIBONE MULLIKEN CORP.
UNIT LUBRICATION SERVICE CARD

UNIT No. W-552 MAKE Ready Power Unit Serial #6893

	ENGINE OIL CHANGE SAE 10	ENGINE OIL CHANGE SAE 20	ENGINE OIL CHANGE	SIGNED
DATE ADDED				
AMOUNT				
DATE CHANGED				
AMOUNT				
DATE ADDED				
AMOUNT				
DATE CHANGED				
AMOUNT				

	WATER PUMP LUBRICATION	GENERATOR LUBRICATION
DATE	5-10-46	5-10-46
DATE	6-8-46	6-8-46

PETTIBONE MULLIKEN CORP.
TRUCK UNIT LUBRICATION RECORD

UNIT No. W-552 MAKE Ready Power Unit Serial No. 6893

		JAN.	FEB.	MAR.	APR.	MAY	JUN
ENGINE OIL CHANGE SAE 10	DATE ADDED						
	AMOUNT						
	DATE CHANGED						
	AMOUNT						
ENGINE OIL CHANGE SAE 20	DATE ADDED		2-24-46	3-24-46			
	AMOUNT		1 qt.	1 qt.			
	DATE CHANGED	1-6-46	2-9-46	3-12-46			
	AMOUNT	5 qts.	5 qts.	5 qts.			
ENGINE OIL CHANGE SAE 30	DATE ADDED					5-21-46	
	AMOUNT					2 qts.	
	DATE CHANGED				4-9-46	5-10-46	6-4
	AMOUNT				5 qts.	5 qts.	5 q
WATER PUMP MONTHLY	DATE	1-6-46	2-9-46	3-24-46	4-9-46	5-10-46	6-4
GENERATOR MONTHLY	DATE	1-6-46	2-9-46	3-24-46	4-9-46	5-10-46	6-4
MOTOR FLUSH	DATE	1-6-46	2-9-46	3-24-46	4-9-46	5-10-46	6-4

Master truck card (top) contains basic information, controls truck lubrication, provides data for point-by-point service, and records cumulative postings. Its companion form is the oil service card, which is filled out on the job. A similar plan covers use of the master truck unit card and its service card (bottom) which are used to keep track of units that are transferred from one truck to another

office master cards. Master cards are filed by months rather than by departments or machine type and number. The master file is a constant working file, bringing up cards daily for required lubrication.

At any time during the year it is easy to determine the amount of lubricant used and the man-hours of service required for any piece of equipment in the plant. This is valuable because decisions regarding replacement or repair are based on these facts and figures.

SPECIAL FORMS

Drums received and returned. Two forms are used to control the receipt and return of drums. Until such records were kept, drums, scattered throughout the plant, were being used as waste bins or else were lying somewhere rusting to pieces. Drums misused in this way represented dollars going to waste. The simple accounting system that corrects this condition is saving the company hundreds of dollars in the recovery of lost drums.

COLOR CODE DECALS

To take the guesswork out of lubrication work and to enable the company to use less experienced men, decals are used to mark every piece of lubrication equipment, including guns, machines, barrels, drums, and tools. The color of the decal denotes the lubricant and the shape of the decal tells when the lubrication should be performed. For example, a green decal denotes worm gear oil and a circular shape shows that the lubrication frequency is daily.

As a result of using the decal markings, new men can be trained and placed on a full-time lubrication job in a few days. The old system called for weeks of training. Also labor costs are now reduced, because less experienced help can be used for the easier and simpler work.

TRUCK LUBRICATION

Truck charts. Until recently, the system used in this plant to set up scheduled service periods for automotive equipment was controlled entirely by the equipment number of the truck. No account was taken of the power unit, which frequently was changed from one truck to another. Some of the units may have been serviced more often than necessary and others not often enough. For this reason, lubrication recommendation charts were developed to give lubrication men complete information regarding the proper lubricant for all types and all parts of automotive equipment, and the proper service period for all lubrication points.

In addition, each lubricant has been given a number for the truck schedule. By keeping these schedules up to date at all times, there is no question but that the equipment will be lubricated with the right kinds of grease and oil on a correct schedule.

Master truck cards. Each truck has a master lubrication record on file at all times. Lubrication schedules are based on length of time trucks are used and the location, taking into consideration such conditions as dust, dirt, fumes.

Each truck has the following points that must be serviced monthly—transmission, drive housing, lift housing, hydraulic system, wheel bearings, steering gear, and chassis. Complete information is given regarding what to lubricate and when.

Truck service card. These cards are sent from the master files in the maintenance department to the truck lubrication men. Once each week a number of cards come up and are sent to the truck department to be completed. The card tells what lubricant to use, how much and how often. When a worker has finished a job, he signs the dated card and certifies that the proper amount of lubricant has been used. Cards are then returned to the master files for the regular posting procedure.

Master truck unit card. Each truck unit has a master card on file. These cards show unit number, make, serial number, points to be lubricated, and amount of oil to be added each month.

Unit service cards. These cards are made up from the master file and are forwarded to the lubrication men. The cards call for point-by-point lubrication and unit drainage. When the service is completed, the cards are returned to the master files for posting. The master card is then moved back to the next lubrication date.

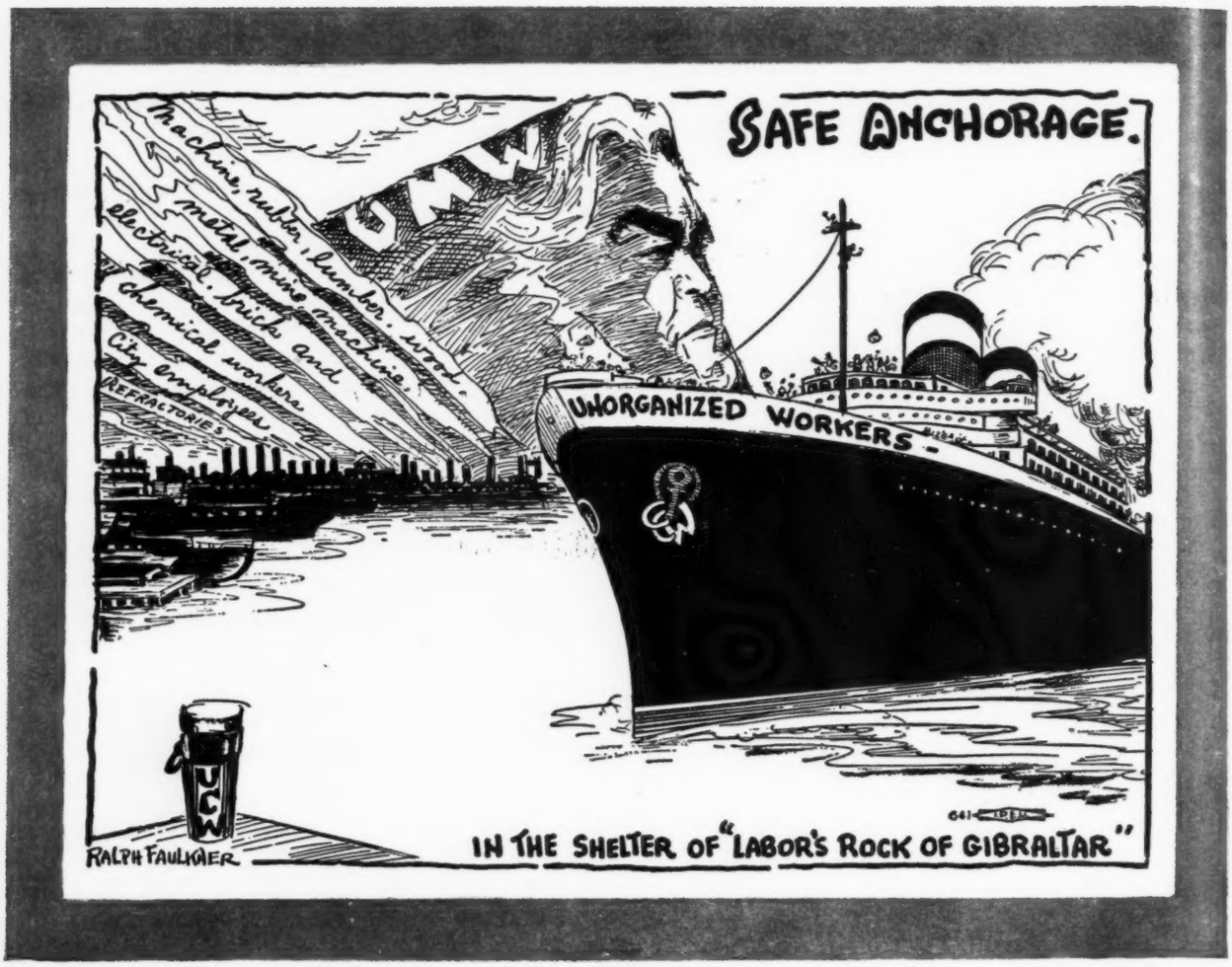
Service unit cards are based on a 12-month schedule. At the end of any month or year it is possible to determine the total quantity and cost of lubricants used on each unit.

LUBRICATION INSTRUCTIONS—AUTOMOTIVE EQUIPMENT*

POINT OF APPLICATION	TYPE	PRODUCT	FREQUENCY OF CHANGE PERIOD
Engines	Oil lubricated	See chart 1	Monthly
Transmissions	Oil lubricated	See chart 1	Six months
Chassis Parts	Grease	#4 — tub	Monthly
Wheel Bearings	Grease, antifriction	#5 — tub	Six months
Motors Generators	Grease, antifriction	#5 — tub	Six months
Motors Generators	Oiled	SAE 20	Monthly
Water Pumps	Greased	#6 — tub	Monthly
Steering Gear	Greased	#4 — tub	Six months
Steering Gear	Oiled	#1 — tub	Six months
Air Cleaner	Oiled	SAE 20	Monthly
Other Engine Parts	Greased	#5 — tub	Monthly
Other Engine Parts	Oiled	SAE 20	Monthly
Lift Gears	Oiled	#1 — tub	Six months
Final Drive	Oiled	See chart 1	Six months
Hydraulic System	Oiled	SAE 20	Three months

*Above schedules based upon two shift operation.

Errors are avoided and maintenance costs reduced through the use of this instruction chart, which provides for accurate, uniform lubrication of automotive equipment



CARTOON, FROM *UNITED CONSTRUCTION WORKERS NEWS*, SHOWS HOW UMW "CATCH-ALLS" SEE THEMSELVES AS A HAVEN FOR WORKERS

JOHN LEWIS'S CATCH-ALL UNIONS

Who they are and what they are up to

PETER FRENCH • ASSISTANT EDITOR, *FACTORY*

Watch John L. Lewis's District 50. Sweeping the country with its name on contracts and not in the headlines, this UMW satellite is steadily accumulating locals and members. The "catch-all" union that used to be good for a laugh at any mention may soon rival AFL and CIO units in power and prestige.

Already well on its way to making good, District 50's all-catching techniques have developed as many surprises as a grab-bag. Affiliated with it are a second "catch-all," the United Construction Workers, and a foremen's union, the United Technical, Clerical, and Supervisory Employees.

Surprising, too are some of the claims District 50 can make on its own:

1. District 50 has won more National Labor Relations Board elections since Pearl Harbor than any other union.

2. It has locals in 44 states and

Canada, in 28 of the 32 major classifications of industry recognized by the NLRB.

3. Ninety-eight percent of its contracts are of the maintenance-of-membership or union-shop type—twice the national average.

4. It has met and beaten every union in the book in organizing campaigns. It is now winning four out of five elections in which it participates.

5. District 50 started the original "Operation Dixie." Ten of 50's organizers went into the Deep South in 1941, catching many a ripe plum in unorganized districts before the AFL or CIO opened up in the territory.

6. It is the first union outside of the UMW to win portal-to-portal pay for its members. Thirty of its contracts now have that feature, and the number is growing.

7. District 50's wartime record on work stoppages was the best of any national union, a fraction of the national average.

The number of members and its finances are one "surprise" that District 50 officers are cagily holding back. With 1200 locals already signed up and 300 well-paid organizers on the go all the time, 50's membership figure is rising steadily. Although the union has never made any claims about membership, Washington observers believe it is at least 100,000.

The District's organizers must have surprised many a management, too. They seem to pop up everywhere. A recent issue of the *District 50 News* reporting winning five NLRB elections—in the coke plant of a West Virginia steel company, in a furniture company and in a fertilizer company in Pensacola, Fla., in an electrical equipment manufacturing plant in New Haven, and in a paint company in Newark. Two other stories told of wage increases won in a manufacturing plant in Chester, Pa., and in the Bridgeport, (Conn.) Gas Light Company. The second story on the page told how the United Dairy Farmers, a division of 50, had secured the highest milk price ever won for dairy farmers in the Port Huron area.

The first story on the page covered the District's successful invasion of a new field. The 350 members of the Rhode Island Shellfish Protective Association had voted unanimously to affiliate. It seems that even New England clams will carry the District 50 label.

Early in November, 50 moved from the beaches to the high seas when it negotiated contracts with four steamship companies for a new affiliate, the United Licensed Officers. The contract covered about 1500 officers, gave them parity with the AFL and CIO sea union groups. In line with UMW policy, the contract gave the ULO members a closed shop with job seniority in each line.

About the same time, 50 scored a national precedent in settling with the Dow Chemical Company, Midland, Mich. The District accepted retroactive and future portal-to-portal pay, dropping demands for a 20-cent-an-hour general increase. Claims for back payment over six years will total about $3,970,000 for some 5500 employees and an estimated 5500 others no longer on the payroll.

The settlement meets the requirements laid down by the Supreme Court in the Mt. Clemens Pottery Company case and has been hailed as a precedent that may be widely followed in meeting second-round wage demands.

Ten years old on September 1, the District was originally set up to take care of thirteen federal locals in the chemical and utility industries which petitioned Lewis for affiliation with the United Mine Workers. It was to organize all the byproducts of coal—chemicals, tanning, perfumes, explosives, utilities—any company that used coal or products derived from it.

Chemical workers are still the largest single group in the union, but Lewis has broadened 50's scope. After shaking out Communists and others in 1941, he appointed O. A. Gassaway president, and Kathryn Lewis, his daughter, secretary-treasurer. Starting from the 18,000 members it had then, District 50 has rolled up enough railroaders to worry the Brotherhoods, enough industrial workers to bother both CIO and AFL, enough dairy farmers so that the union dominates the field.

John T. Kmetz, who replaced Gassaway in 1943, typifies many of the District's officers in that he grew up in the coal mines and the UMW. Kmetz went into the mines at six years old, joined the union even before John Mitchell organized the UMW in 1902. He is also an international board member, like several other 50 officers who hold dual posts in the two unions.

Although 50 was once known as "Kathryn's union," she has been inactive recently. However, the *News* still carries a weekly column under her name.

The District operates quietly. It put out no publicity releases in 1946 until a brief announcement to the press postponed the Long Island Railroad strike. But it is in the spotlight compared with its catch-all competitor, the UCW.

Twin sister to District 50, but less glamorous, is the United Construction Workers union. Linked to 50 as a means of affiliation with the Mine Workers, the UCW is actually competing with 50. It has 400-plus locals, about 50,000 members, and 120 or more organizers operating in approximately the same industrial spread as 50.

Almost unknown to newspaper readers, John T. Kmetz is president of District 50. His union reflects his driving energy, will be watched in months to come as it challenges older unions on many fronts

Although UCW doesn't boast the strength in the West which has given 50 dominance in many of the mountain states, it also has railway workers, steel workers, and other locals in the same areas and industries as 50's locals. Its biggest single group of members, though, is made up of refractory workers and

building and construction workers.

Organized in 1939, the UCW was to be an industrial union for building workers—one union to represent the workers now covered in 21 craft and trade unions. It was just beginning to roll when the war struck and government contracts virtually froze union status in the construction trades. The UCW then turned to workers in the plants supplying construction materials, broke away from the CIO just before the UMW did, and, in 1942, dedicated itself to "organizing the unorganized."

Heading District 50's twin, the United Construction Workers, A. D. Lewis leads a second "catch-all" organizing the unorganized in any industry

Since then, its organizers have rolled up a success story paralleling District 50's. Its "Victory Parade" in the UCW *News* has about the same geographical and industrial coverage.

Under Director A. D. Lewis, brother of John, and Comptroller O. B. Allen, its work stoppages have been so small that the officers haven't bothered to figure them. If they were computed, they might even upset District 50's claim. This doesn't mean that the UCW hasn't had strikes. It has, but chiefly in winning recognition and then the majority have been small, short-duration walkouts.

The third affiliate of the UMW, the United Technical, Clerical, and Supervisory Employees union grew out of an independent foremen's union organized in the coal mines. It was accepted into the UMW at the 1944 convention in Cincinnati after petitioning John L. Lewis for affiliation.

YOUNG, BUT ACTIVE

Organizing chiefly in the coal fields, the "foremen's union," under Director William McAlpine, has been recruiting actively only a little more than a year. It is reported never to have lost an election, but it hasn't yet won a final decision from the courts on the status of foremen under the Wagner Act. Given a go-ahead from Congress or the Supreme Court, the UTCSE will give the Mine Workers another powerful arm.

Although District 50 and the Construction Workers are in competition, they have much in common. They both have members of the Lewis family as officers. The officers of both unions are appointed by Lewis and the executive board of the International.

Officers in the locals are elected. But under UMW policy, the national and district officers are appointed, like those of any UMW district that is not self-supporting. Both the unions have spent their surpluses in organizing and may have been subsidized by the International.

District 50 and the UCW have a common policy on organizing. Neither raids established AFL or CIO locals. Both at times have refused to accept locals seeking to split away from AFL and CIO unions. But the Federation and the Congress have complained bitterly when they met 50 organizers in competition.

Both "organize the unorganized" and fight hard to win recognition elections against anybody's organizers. Between themselves, though, they give a clear field to the outfit that "gets there first." Naturally, they fight with no holds barred to stave off raids on their own locals.

About 15,000,000 workers in this country are union members. District 50 estimates that about as many more are eligible. Government studies have estimated that an even greater number are eligible, perhaps another 30,000,000 who may eventually be organized. So the two catch-alls believe they have plenty of room in which to run.

Working with the UMW, the catch-alls have concentrated enough power in the coal fields so that they have almost a monopoly of all workers in some areas. One coal area including several towns is reported to have only one CIO local and one AFL local left in a sea of UMW locals. And the surrounded AFL and CIO groups are reported wavering toward District 50.

The two give Lewis and the UMW other advantages:

1. District 50 is a threat to the Brotherhoods. The Long Island Railroad case, in which 50 refused the terms accepted by the Brotherhoods, clearly gives the Brotherhoods notice that the battle is on.

2. Similarly, the UCW, although it has only a few members in the construction industry now, might be real competition for AFL and independent building trade unions. If the craft unions fail to deliver to their members, or if the UMW and AFL fall out again, the UCW stands ready.

3. Although the opposition laughed when 50 did not sign up 3,000,000 dairy farmers overnight, the farmers have joined the Dairy Farmers Division by the thousand, and the division has won a series of price battles for them. Quietly but steadily the division is bringing control of another big section of the economy under the Lewis banner.

4. In combination the UMW's monopoly of miners, the hundreds of locals in coal field areas and in coal byproduct plants signed by 50 and the UCW, and the supervisors enrolling in the UTCSE, give Lewis a still greater power in coal.

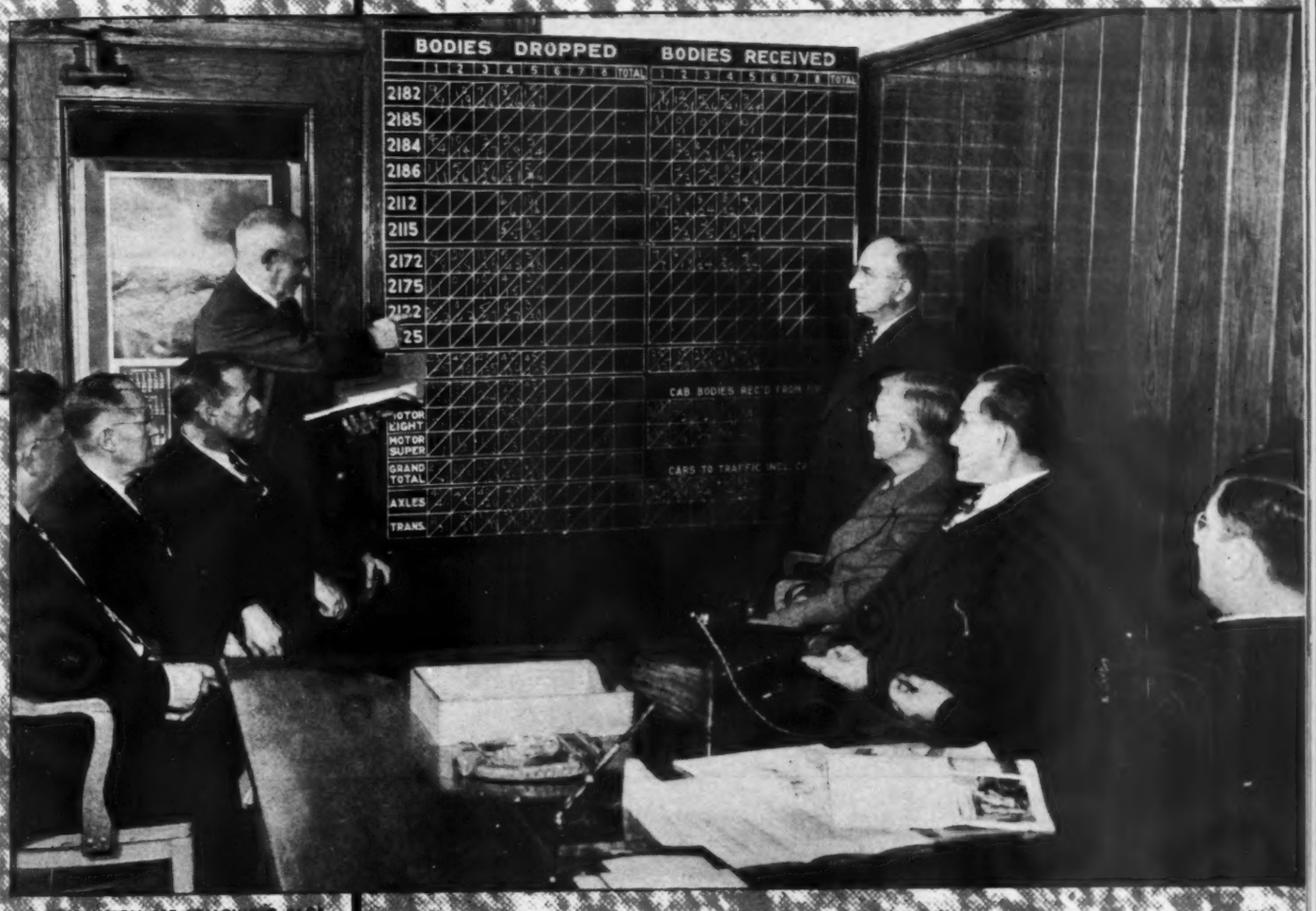
Despite rumors that Lewis might call out all locals affiliated with 50 to support his December strike, it is doubtful that he could. Some members apparently do not even realize that they're part of the Mine Workers. As one official of 50 put it, "Some of them think they're part of District 50, AFL." In addition, the locals have contracts, many of which have no-strike clauses.

Perhaps the most aggressive of all industrial unions, District 50 and its affiliates are certain to pop more surprises as they develop muscle. As it is today, any industrial relations man in the country may wake up in the morning to find his workers affiliated with District 50 and that he's in the ring with the Mine Workers.

More and more as it expands, the District will be something to watch.

FACTORY MANAGEMENT AND MAINTENANCE • Plant Operation Library No. 100 • December, 1946

Copyright 1946 by McGraw-Hill Publishing Company, Inc. 330 West 42nd Street, New York 18, N. Y.



FOR DESCRIPTION SEE FOLLOWING PAGE

Production Planning

H. P. DUTTON • CONSULTING EDITOR, *FACTORY*; CHAIRMAN, INDUSTRIAL ENGINEERING DEPARTMENT, ILLINOIS INSTITUTE OF TECHNOLOGY, CHICAGO

. . . planning FUNDAMENTALS

There is no particular one best system of production planning. There are particular situations, varying in the volume and number of products and in the investment and costs involved. There are procedures, devices, and forms developed by experience. From this battery of available methods one selects and puts together parts, to make a system to fit a situation.

Furthermore, the situation and consequently the system of production planning for a particular plant are not static. They change or should change as the needs of the business change. The problem is to find the balance of factors for which the total cost, including all factors of customer good will, stability of working force, and economical employment of capital, is least. Finally, the system that is suitable for a small jobbing business can be simplified and reduced in cost as volume increases and the variety of operations decreases, or as it becomes possible to distribute the product line among separate plants or departments, each making only one or a few varieties.

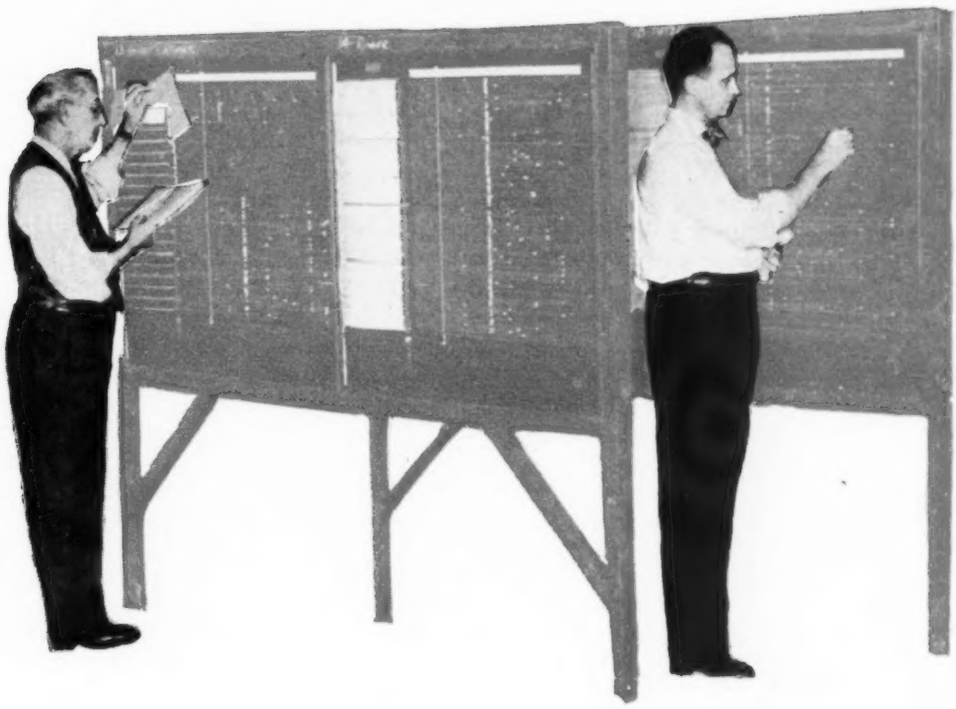
In any situation, the production planner (or planning department) is faced, first, with the problem of prearranging the bringing together of men, materials, and equipment in the most economic fashion possible to produce a desired quantity and quality of product or products. Second, he must promulgate systems of control by means of which the fulfillment of his plans may be assured. Thus, while he executes neither, the production planner must plan for production, and for production control.

There is a certain captivating quality to the devices and procedures used in production planning and control; planning boards and systems give full play to the pleasure in making things and working out puzzles. Perhaps because the problem of designing a system is such a fascinating one, there is often a tendency toward unnecessary intricacy, or toward the adoption of unsuitable or unnecessary controls, simply because they have worked somewhere else, or look interesting. It will be the attempt in this discussion to present the things to be accomplished by a system of production control, in the various manufacturing situations typically met, and to refer to devices such as control boards incidentally, as illustrations of how the production problem is met, rather than to catalog them completely. Current issues of FACTORY describe up-to-date devices from time to time; if we understand the basic elements in this problem, it is no special trick to select or develop our own forms and devices.

Although straight-line production

COVER PHOTOGRAPH (preceding page)

Production information is posted to the control board on the wall of the factory manager's office at Packard Motor Car Company. On the basis of this information, the factory manager and his seven key division managers (shown here) lay plans affecting the entire production picture throughout the manufacturing sections



When the part was ordered, from whom, when promised, and when delivered—100 percent control over every part. Information on these boards is vital to the planners

is usually the final stage in the evolution of a manufacturing business, it is the simplest in theory. In the factory making one product only, we may regard the whole plant as a single machine, whose various components and machine elements are balanced so that, if each works steadily, it will produce enough parts or perform the operations required for the desired output. Once such a plant has been built, the planning problem consists of determining how long it must run to produce for the obtainable volume of sales (or sometimes, as during the immediate post-war period, how to keep it in operation at the utmost capacity). Sales may indicate operation for one, two, or three eight-hour shifts, or may make it necessary to schedule shutdowns.

PLAN FOR CONTROLS

Once the schedule is made, plans must be made for adequate controls to see that it is met. Machines break down, materials are not delivered on time, key men are absent, vacations unbalance working forces. All sorts of things happen, and we need a procedure to bring the difficulties to the attention of those in a position to remedy them, and action to apply the remedy.

Only a minority of businesses are of this simple, straight-line type, although the economies of this type of production tend steadily to concentrate sales of volume lines in companies or units large enough to permit continuous production. In the majority of factories, either one basic product is made, but with variations which modify the operation of the straight-line system, or several or many products are made which, while their processing requirements may overlap, do not follow the same process sequence or use altogether the same machines.

Any production situation presents the elements just named—*the need for making and following up a schedule.* But when a diversified line must be made, to these problems is added the problem of so arranging the work on the various orders and products that their schedules will not interfere with one another, meet promised delivery dates, and keep the shop busy.

The difference between straight-line and jobbing production may be brought out by a simple illustration. Suppose that product *A* requires the following sequence of operations—*drilling, lathe work, assembly.* Product *B* requires *assembly, drilling, assembly.* Now if only product *A* is to be made, the machine layout will provide, in order, drill presses, lathes, and assembly benches, with enough of each to produce the desired output. However, this layout would not be right for *B*, and in a general jobbing shop there often is no single common sequence of work. Enough equipment will be required to perform the sum of the necessary operations on the various products to be sold. But since orders usually come irregularly the shop will never, except by accident or very good sales planning, be in exact balance for very long.

Work is planned in such a factory by making up temporary groupings of machines to fit the needs of current orders. Product *B* goes to assembly; likely there are other jobs ahead of it and it waits its turn. When this operation is done, the job moves to the drill press and waits its turn, and so on to shipping.

When a variety of products are to be made, we have two alternatives. One is to provide enough general capacity and to route the work as indicated above. Or, if the volume of any one or several products warrants, we may take the machines needed for a production line out of the general shop and set them up in a straight-line arrangement, running the line intermittently as there is a demand for the product. Often one part of a business operates on a straight-line basis while another uses a different plan. Thus, in the automobile plant, assembly is usually to order, but parts are produced on a straight-line basis.

CONTINUED ON NEXT PAGE

. . . planning CONTROLS

Certain steps are nearly always involved in filling a customer's order. In some cases these steps must be taken every time an order is filled; in others, they need be taken only once or occasionally, when the product is changed. Designing the product, for example, is, at least in the details of adapting a basic construction or pattern to the customer's needs, a matter of routine in the special-order industry; it is done only at occasional intervals when the product is unvarying.

Design

The first step in production is *design,* first of the product itself (about which little will be said in this discussion), and second, of the procedure and methods for processing. Product design is generally the function of the engineering or design department, although with a standardized product the need for this service may be so occasional that design is handled as an incident to other duties, or is farmed out to firms specializing in it. Process design, or routing or methods work, may come under the engineering department. More commonly it is a division reporting to the factory superintendent or manager, working with and familiar with the work of the engineering department but independent of it.*

Process design may involve two operations, differing more in degree than in kind. When a new product is launched which differs in any important respect from an existing product, there are usually problems of selecting or designing the right machines, and designing jigs, dies, fixtures, or special tools. In addition to this work of tooling up, much attention has been given—by progressive concerns and profitably—to motion economy, the arrangement of the work, and the training of the operator for fast and easy fabrication and assembly.

When a new product is to be made for the first time, a substantial amount of work must often be done to develop and teach the best manufacturing methods. With jobbing manufacturers, such as the makers of special machinery, there is often the routine problem of adapting a basic design—for example, a type of conveying equipment—to the customer's dimensions or needs. And in many companies manufacturing a variety of products it is necessary to specify the order of operations. This work is done by a routing clerk. It is usually possible, when the same products are repeated at intervals over and over again, to develop standard routing instructions, which may not only embody the order of processing but also allowed or standard time, the standard bill of materials, and the standard material and operation costs. Then when an order is received, a blueprint, set of addressing plates, hectographed sheet or set of forms is merely drawn from the file, filled in with the order number, dates, and quantity and started on its way to the shop.

Procurement

The second step in manufacture is *procurement,* which may involve purchasing or merely checking stocks on hand. Except with the quota system of production control (to be described later), it is usually advisable as a matter of routine to clear the order through the stock records, making sure that all required materials are available, or ordering them if not. If materials are not in stock, a control should be set up by which the order is not released to production until the missing items are received. One way to do this is to put an expediter in charge of a group of orders, someone who will check up the receipt of goods for the orders in his charge. The stock records may also be flagged, so that on receipt of the missing item the expediter, or other person in charge of the order, is notified accordingly.

Scheduling

The third step in production is *scheduling.* As a result of the work of the methods department, the order of processes is known, and often the time required by each operation may be estimated, with varying degrees of accuracy.

In a straight-line industry the schedule is simple. We know the capacity of the line and can estimate the time required to put any order through, simply on the basis of the total hours for the job, added to the hours already allocated to jobs in the schedule.

Where the basis of layout is the process rather than the product, and where there is no unvarying order of operation, scheduling is a much more complicated operation. One job goes from machine *A* to *B* to *C*. There will be work ahead at *A* and *C*, perhaps. Consequently, the schedule for starting at *A* will be the sum of the days of work allocated to prior jobs at *A*. The job can start at *B*, at zero day plus time for prior jobs plus time for finishing *A*, and so on.

One can set these schedules up graphically on some form of the Gantt chart. In such a chart as this, a line is set aside for each machine or group of production units scheduled as a unit. Distance horizontally along this line indicates time, to any convenient scale. The production requirements for an operation are reduced to time requirements, and a line is drawn in the space for the machine required, to indicate that this time is reserved, thus filling up the available capacity when the production center is busy.

In theory, all operations on an order could be scheduled at once in this way, laying out a complete

*There are cases where inspection, methods improvement, and some work of an engineering nature are brought under one head, on the theory that the principal function of inspection should be preventive and curative, and that such a combination of functions facilitates action to translate the detection of difficulties into a remedy.

schedule for the whole factory. But the changing of even a single operation in this schedule might throw out subsequent schedules, so that it could be maintained only by constant and probably extensive rearrangement. Where processes are simple or few, as in paper making, or where it is of critical importance to get the utmost production out of machine capacity, the costs of complete scheduling of all operations may be justified. But, for many purposes, only the "next operation" is scheduled. That is, as an operation is completed, the schedule clerk goes to a file of instruction or time cards, prepared in advance for each operation, takes out the card for the next operation, and gives it a place in the schedule of the machine to do the work—and so on until the job is completed.

TAYLOR BOARDS

The Taylor planning board operates on a somewhat simpler system than the Gantt chart. Instead of a line, divided to a time scale, for each production unit, the Taylor planning board uses one or more hooks, clips, or pockets. Instruction cards for work ahead of the production unit are filed in this pocket or clip, in the order in which they are to be done, next job on top or at the front, and a change in the order of work may be made simply by shuffling the cards into the desired order. No time of completion is indicated by the Taylor board, although an experienced man can estimate the work ahead of a particular order by checking the unit times and quantities of work on orders ahead. But the critical decision in scheduling is as to priority of orders; there is not much that can be done about time, once the order of work is determined. And the Taylor board controls the order of work as effectively as, and more simply than, the Gantt chart.

In addition to the pocket for work ahead, the Taylor board may be equipped with a pocket or clip for the job in work, and a third pocket for work in the shop but at other operations and not yet ready for that production center. This third pocket is convenient in looking for work for a machine; the production clerk can glance through the preceding operations for which jobs coming to the machine are waiting, and perhaps modify other schedules so as to keep the machine busy. When the third pocket is not used, cards for "operations not ready" are held in a general file by order number, to which reference is made for the next operation when an operation is completed.

Instead of writing an instruction card for each operation, the route sheet itself, or a modification of it, may travel from machine pocket to pocket as work progresses.

The data as to times, when known, can without difficulty be entered on time cards of tabulating-machine type. In fact, some companies carry the routing for a product on a series of standard tabulating cards, coded so as to serve as instruction cards. When an order is received for a certain product, the instruction cards can be sorted from the file, and working cards for the order giving instructions can be prepared by mechanical duplication of the punched holes. These cards may then be gang-punched with the order number, quantity, etc., and, after the work is done, the actual time and labor cost may be computed and recorded on the card by punching. In this way, a large part of the clerical work of control may be done mechanically. Tabulating equipment is particularly useful in keeping track of machine loadings. If the estimated time for the operation is punched on the card, with the machine code number, the tabulating equipment will sort out and totalize the load, in hours or days, ahead of each machine or each group of machines in the shop.

Dispatch

The fourth stage in production is *dispatch*. The schedule may be made up days or months in advance. Automatic means must be provided by which the order is brought up for issue and performance, at the time set. The stage of dispatch may properly include arrangements for delivery of materials, instructions, tools, and so on.

With the Gantt or Taylor planning board, dispatch is usually accomplished by taking the "next operation" card from the rack, when a worker reports the completion of the operation he is on. In straight-line industries, and with a less centralized control in jobbing industries, the foreman is often supplied, at weekly or periodical intervals, with a list of jobs to be done, with the required date for each. In general, better results are secured if no more work is included in such lists than can be accomplished with diligence by the foreman. Men work best when there is plenty of work in sight, but not enough pressure for performance to cause them to lose their heads, or to call for overtime or other emergency expedients to remedy what they will doubtless come to consider as an unwholesome situation. Such situations, more often than not, result in the adoption of slipshod methods by those most severely affected.

Follow-Up

After the completion of the operation (which is the object of planning but not a part of it), a fifth and final stage of production is required, *progress record* and *follow-up*. The progress record shows what is happening to the order. On the Gantt chart, a heavy line may be drawn underneath the schedule line, showing the stage of completion of each order. In a flow industry, the progress record may be kept by recording actual against scheduled deliveries of finished product, or where further control is desirable, at any number of stages or processes before completion.

The progress record shows what is happening to the order, but does not in itself do anything to correct delays or difficulties. It is a simple rule of organization that things do not get done unless someone is responsible for doing them. The action indicated by the progress record may be taken by the superintendent or his assistant in a production or straight-line type of industry. In a jobbing type, making

a variety and varied order of products, the amount of follow-up required often becomes such that one or more men must give full time to it. Usually each of these men assumes responsibility for one type of product, one class of customers, or one or a group of departments.

The follow-up man receives a copy of the order and, from that time on, assumes personal charge. He ascertains, or is informed, when material is ready, and releases the order to the schedule clerk. He then files his copy in a date tickler file, to come up when he estimates it should next have attention. At that time, he checks progress; if the order is for any reason held up, as by a shortage of some material, he initiates the steps needed to remove the cause for delay, or discusses with the schedule clerk the possibility of shifts in schedule or other action that will improve the situation.

A necessary rule is that the follow-up man, or expediter, locates difficulties, but does not (unless the difficulty cannot possibly involve conflict with other orders), act to remedy them. For example, he lays his case before the schedule clerk, but does not have authority to change the schedule. If he did, obviously his orders might prosper at the expense of the equally important orders of some less aggressive expediter who simply did not assert himself so forcefully.

Master stock control board enables scheduling and distribution executives at Ford Motor Company to appraise at a glance the status of all purchased and stock items at the Rouge assembly unit and at the company's 13 branches scattered over the entire country

. . . planning MANUFACTURING

Production orders may originate in one of three general ways. The first of these is manfacture to customer's order. Work is started, and in some cases material is ordered, only on receipt of the customer's order. Thus steel is generally rolled to order.

Stock Limits

A second system is manufacture to *stock limits*. In this plan, used generally where a variety of products are made, a high limit (ordering quantity or "maximum") and a low limit (ordering point or "minimum") are set. A perpetual inventory card record is usually carried for each item stocked, although the system can be operated without records, simply by ordering when stocks get low. Whether records are kept or not, when the minimum is reached an order is placed for the maximum stock.

The *minimum* is calculated so that the supply on hand at time of ordering will be sufficient to last until the new order is delivered, *minimum = (rate of use) × (time required for delivery) + (reserve)*. The reserve is based on judgment or may be calculated mathematically. It should be sufficient to absorb probable irregularities in demand or delivery.

SETTING LIMITS

The *maximum* is set at the point at which the total cost is lowest, offsetting the advantage of quantity buying or production against the cost of carrying stock. In general, there is a cost for handling the order, setting up machinery, and the like, which often is little or no larger for a big order than for a small one. The larger the order, the smaller becomes the share of this fixed cost which must be borne by any single unit of the product. This cost per unit decreases rapidly at first, then more slowly as the size of the lot increases, finally becoming almost negligible.

On the other hand, the larger the order, the longer it will last for any given rate of demand, and the larger will be the average stock. A monthly order in quantities of 1000, allowing the stock to go to zero before receiving a new lot, will supply the same quantity per month as two orders of 500 each. But the average stock will be 500 in the first case and 250 in the second. (It is usually not advisable to allow stocks to be completely exhausted before receiving new stock, but while included in the minimum, the reserve stock is computed independently.)

Carrying inventory ties up working capital, as well as increasing the cost of storage space, insurance, personal property taxes, and handling. Money tied up in inventory should earn at least as much as in other uses, so the cost of carrying inventory should include interest at the prevailing borrowing rate, or, if the firm is not abundantly supplied with working capital, at the rate the money would earn if put to other uses in the business.

ADDITIONAL RISK

Added to these costs is the risk of loss by deterioration of the product in storage or by obsolescence. A fair estimate may be made of this risk (which must also be counted as a cost) by dividing the annual loss of material scrapped, or sold at a loss because outdated or damaged, by the average investment in inventory. This cost may run 5 percent or much more or somewhat less, according to circumstances. The risk from this source probably increases more than proportionally with increasing inventories, since rapidly moving items have little chance to rust, spoil, or get out of date; however, this cost is usually taken as an average annual rate.

The sum of these carrying costs may run, typically, from 10 to 18 percent. Combining the declining set-up costs with increasing lot size, with the increasing carrying charge, a point of least cost may be found by the formula

$$Q = \sqrt{\frac{2RS}{IC}}$$

where Q is the economical lot size, R the annual consumption, S the set-up cost per lot, I the annual carrying charge as a percent and C the cost per unit of the part or product.

Although this formula is applicable particularly to the stock-limit type of industry, a similar balance of factors must be taken into account in any production situation. The investment in inventory may amount in a typical manufacturing business to a third or a fourth of the total assets. Correct management of inventory is therefore one of the major problems of management. The problem does not occur in exactly the form stated in other types of control, but in any except the purest type of customers' order business (and even here usually for raw materials) we meet the problem of making up goods to stock during a slack season, or of making, or ordering from vendors, in large or small lots. While the mathematical formula given may not fit such cases, the balance of cost factors may be similarly worked out for the alternatives presented by the various possible plans of operation.

Quota Control

Third of the basic systems of ordering is *quota control*. The expected sale of each product, style, or unit is estimated in advance and production is keyed to this estimate. Thus monthly sales of model 120 might be estimated at 100 units in January, 150 in February and March, 160 in April, and so on for the year. The estimates would be made by the sales department, and based on (1) previous experience, as indicated by the normal seasonal demand for model 120; (2) spot checks of the quantity local dealers

or customers expected to use during the next season; (3) corrections for probable increasing or waning popularity of the item; (4) corrections for general business conditions, the business cycle, or cyclic factors affecting the particular product, as good crop years, building booms, population migrations or similar business phenomena.

The sales department would probably turn to the production department for its records of consumption, since it is in this department that these records may be most conveniently obtained, as a byproduct of production and stores control. The estimates submitted by the sales department, since they become the basis for the whole plan of operations, are of critical importance, and are usually submitted to the scrutiny and discussion of the production department, comptroller, purchasing agent, and other members of the executive committee before being authorized. They are also reviewed continuously, the estimated being compared with the actual sales as the latter develop. Usually the production department can most conveniently keep these records, as a byproduct of the perpetual inventory.

Once approved, the sales estimate becomes an authorization to manufacture. Purchasing contracts are made and production schedules set up to produce at the desired rate. (Production may still be in intermittent lots, if the total volume of an item is insufficient to justify continuous production, and in this case the theory of economic lot sizes would apply).

CORRECTING FORECASTS

It may well be asked, *what would happen if a serious error were made in these sales estimates?* Indeed, the first year's experience with a quota system is likely to involve some anxious moments. Enough stampings, say, were ordered for 50,000 units a month, and it turns out that the demand for the product was a flash demand and sales dwindle to 5000. Or 5000 units were scheduled and the demand jumps to 50,000. In either case, the purchasing department is probably in for some fast footwork, delaying or if possible canceling deliveries, or attempting to step them up or to locate new emergency sources of supply, to fit the conditions.

The sales department will probably make a pretty fair showing, even the first year, on total actual as against estimated sales. It is on the individual items that the discrepancies come. Some are likely to be estimated too high; some, much too low. Of course, the continuous comparison of estimated against actual sales shows up changes in trends and permits corrections at the earliest possible moment. Also, it is a matter of common prudence not to commit ourselves to purchase contracts before there is an advantage in doing so; the schedule is there and releases or purchases are made in an orderly way as needed. And if, for any reason, stock piles up, we can still shut off supplies and production at the earliest practicable point, and use up the surplus before making any more.

Many firms found themselves forced to adopt some form of quota control at the start of the war, when the government's Controlled Materials Plan and similar plans, as well as the extreme scarcity of materials, made long-distance planning imperative for survival.

One company that made the change from stock-limit to budget or quota control found, after the initial period when all concerned were learning to operate the new plan, that inventory turnover was nearly doubled. Furthermore, a very valuable teamwork developed among the various departments. If the sale of an item was lagging behind estimates, the fact was brought out in the biweekly production meeting and means were canvassed for promoting the sale of this slow item.

For example, at one time a piece of promotion literature, planned for a product that at the moment was moving well, was switched to a slow-moving one. Similarly, the opinions of the purchasing agent as to the prospects of getting or not getting motors and certain critical castings were taken into account in making sales plans for the products. Equal weight was given to the capacity of the shop; if a certain product was tying up assembly badly, or was running seriously behind schedule, and if all alternatives, such as subcontracting, were ruled out in preliminary discussion, the sales department was on notice to deflect sales effort to more readily available products.

Before the sales department learned to work in team with the other departments, there was a time when the backlog of orders (the salesman's dream come true) was so large that virtually no order could be delivered within months of the promise date. Naturally customers waiting for critical repairs or new installations grew anxious, and the wires were kept hot with calls to expediters, who in turn demanded information, whose compiling still further slowed up production. Partial shipments and back orders became the rule, nearly doubling billing and shipping costs, and several high-priced men were kept busy attempting to straighten things out for the most urgent customers. The simple expedient of slowing up sales enabled production again to be brought into something like balance, with reduced costs and, because of fewer interruptions, greater total volume of production.

REDUCED STOCKS

One marked advantage of the quota plan over stock-limit plans is in the reduction of duplicate stocks. It is common under the stock-limit plan, although not necessarily inherent in it, for stocks to be carried not only of finished products but also of subassemblies, parts, and raw materials. A part is often used on more than one product, and the carrying of parts under stock limits does minimize the amount of discretion necessary to maintain stocks. *But it does so at the expense of increasing the inventory.*

Under the quota plan, requirements for all identical parts and materials are totalized. A furnace, model 5, may require 100 pounds of 26-gage galvanized sheet steel. A drier may require 40 pounds. If the sales quota calls for 100 furnaces and 50 driers, the extended requirements will total 6 tons of steel of this size. This system of ordering makes possible lower inventories and better combination of requirements for quantity prices than does the stock-limit plan.

Stock-record keeping may be

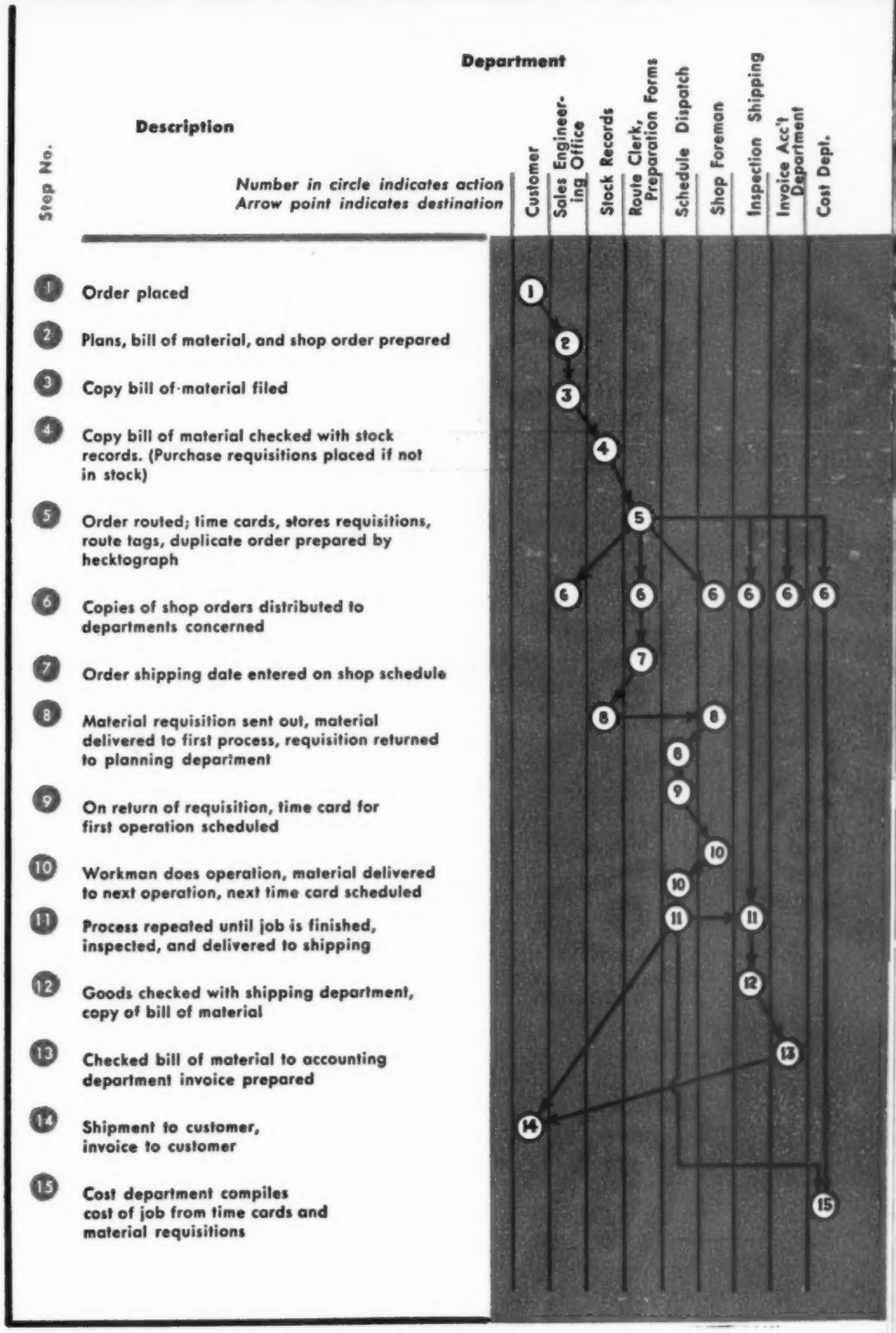
somewhat reduced under this plan, when storeroom and material-control discipline is good. If all requirements have been ordered and receipts verified, if schedules are carried out as planned (or modifications have been covered by appropriate adjustments in procurements), and if losses and spoilages, beyond normal allowances, have been similarly re-ordered, then it follows that what was put in must come out, and some of the costly clerical details of requisitioning out of, and receiving into, stores may be omitted. There are several *if's* in this statement. But the writer has experimented with the plan sufficiently to believe it practicable when it is employed in the appropriate circumstances.

PERPETUAL RECORDS

A tight stock record or perpetual inventory is advisable for finished stock records; this, for one thing, gives an adequate separation, useful for various reasons, between finished, raw, and in-process, stock. Where foremen are supplied with clerical assistants who can take care of stock, or where the department, or the amount of material concerned, is small and simple, raw materials are charged to the foreman, who assumes the responsibility for reporting spoilages or other diversions or losses. The foreman checks up the availability of material on receipt of production orders, as far as needed to assure himself that required materials are on hand.

Stock records will continue to be kept for certain valuable or important materials such as motors; these materials may be kept in a centralized storeroom when the foremen are not equipped to take care of them. But where there is a definite order of processes and a logical point for the storage of a group of materials adjacent to the point at which they will be used, not only handling but also control costs may well be reduced by decentralization, the materials being stored at point of use and the foreman supplied with the facilities, including stock records if needed, to control his own materials.

The combination of elements above suggested would of course apply only in a particular setting.


Department
Description
Step No.
Number in circle indicates action
Arrow point indicates destination
Customer
Sales Engineering Office
Stock Records
Route Clerk, Preparation Forms
Schedule Dispatch
Shop Foreman
Inspection Shipping
Invoice Acc't Department
Cost Dept.
1 Order placed
2 Plans, bill of material, and shop order prepared
3 Copy bill of material filed
4 Copy bill of material checked with stock records. (Purchase requisitions placed if not in stock)
5 Order routed; time cards, stores requisitions, route tags, duplicate order prepared by hecktograph
6 Copies of shop orders distributed to departments concerned
7 Order shipping date entered on shop schedule
8 Material requisition sent out, material delivered to first process, requisition returned to planning department
9 On return of requisition, time card for first operation scheduled
10 Workman does operation, material delivered to next operation, next time card scheduled
11 Process repeated until job is finished, inspected, and delivered to shipping
12 Goods checked with shipping department, copy of bill of material
13 Checked bill of material to accounting department invoice prepared
14 Shipment to customer, invoice to customer
15 Cost department compiles cost of job from time cards and material requisitions

SHOWING THE GENERAL STEPS TAKEN IN FILLING ANY ORDER

The advisability of omitting stock records short of a complete control depends on the question of whether losses of material and loss of control will offset the saving in clerical costs. It is better to err on the side of control, since otherwise we may find ourselves unexpectedly in an awkward position. The question of decentralization depends on the balance between cost of handling materials and cost of multiple controls. Generally a central storeroom is indicated unless (a) the value of the material is so low and its control so simple that specialized storekeeping is not necessary, or (b) the quantities justify a self-contained local storeroom. Stock records for local storerooms may be centralized, but where traffic warrants local installations, there is again an effectiveness of control when stock clerks are close to their materials.

CONTINUED ON NEXT PAGE

. . . planning PAPERWORK

Whatever the plan of issuing orders and controlling production may be, there exists in every shop a need for preparing the orders, invoices, and other documents needed in getting goods to the customer, and in putting work through the shop. In the customer's order system of manufacture, an order is required for every shipment, and it is usually possible to use one or more copies of the customer's order as the manufacturing instructions. In the stock-limit and quota plans, shipment is normally from stock. Sometimes the receipt of a special order or other circumstances make it necessary to manufacture directly to the customer's order, but in general a production order is originated only when stock of the item is drawn to the "minimum" and an order is placed for the "maximum." Or, in the quota systems, production is against the sales estimates, plus the revisions indicated as the season progresses and it can be told more closely how each particular item is selling at the time.

In the small shop, orders are often handled with great informality; the bookkeeper tells the foreman to ship two of a certain item to Jones & Company before noon tomorrow; the foreman notifies the bookkeeper to make out the invoice when the goods have been shipped. Or the foreman notices that stock of an item is getting a little low and tells one of the men to make up some more. Such procedures may look primitive, but they reduce handling costs. When they are sufficient, it would be a mistake to "modernize" them. But there are limits to the memory of an individual, and as the scale of operations increases, the work of production control must be subdivided into parts, which must be carried out by individuals who need understand only their part of the total operation.

As this step in the evolution of control is reached, the number of forms increases and it becomes economical to produce as many as possible of the required copies at one writing, saving both the cost of copying and the mistakes that creep in when data must be recopied by hand or on a typewriter.

It is often advisable to be rather free in the number of copies produced. For example, when an order is drawn from stock and shipped, the next steps are usually to notify the accounting department to send the invoice, and to notify the stock record clerks that the materials or products are withdrawn. Time is of the essence with both of these operations. If only one copy is made of the shipping ticket, one or the other of the above steps will have to wait; where two copies are available, both steps can take place simultaneously. There are many similar situations where time can be saved by using forms in parallel rather than in series arrangements.

Care must be used to see that unnecessary forms are not produced, or that forms whose function is completed are not filed or further uselessly processed.

Customer's Order

The steps usually necessary in filing the customer's order and the forms useful in carrying out these steps are listed below.

Usually two copies of the *invoice* are mailed to the customer together with the bill of lading or other shipping documents.

On receipt of the order (if it is not to be filled immediately) an *acknowledgment* is usually sent. In addition to constituting an acceptance of the order and giving a promised date of delivery (where such a promise can be made), the acknowledgment affords the customer a chance to verify the correctness of the order as written.

A *packing slip* is usually enclosed with the goods, showing the contents and, for reference, the shipper's and customer's order numbers.

An *address label* may be prepared for small shipments.

A *shipping department copy* is written. This copy may go to the shipping department at the time the order is issued, remaining in the file of unshipped orders until the goods have been packed. As packed, items are checked on the shipping list, which then goes to the accounting department as notice of shipment and record of what was shipped.

One or more *salesmen's copies* may be made, to notify the salesman and branch office of the acceptance of the order, and for use in computing the commissions which are due the salesman.

A copy may be made for the use of the *stock record* department, or the shipping department copy may serve this purpose.

An *office copy* is often made, giving a complete file of open orders for reference. This copy may be removed from the file on completion of the order.

An *accounting department copy*, filed with the invoices at the time the order is written, will be filed by customer's name alphabetically, on filling the order, giving an accounts receivable ledger. In other cases and more commonly, this copy or the shipping copy is used for posting to the customers' or accounts receivable ledger, being then filed as the supporting record of the details of the indebtedness.

Certain information, such as prices and discounts, may not be wanted on all copies. In designing forms, it is frequently possible to place all such information in an area, (such as the right-hand side of the form); so that the information will appear only on the copies desired. In a fanfold billing machine, for example, a narrower roll of carbon paper is used with the copies from which the information is to be omitted. With duplicating systems, the part not wanted on the stencil may be masked, or cut off after the first copies have been run.

Sometimes the order is not shipped as originally written, certain items being changed, or "back ordered" for subsequent delivery. In this case, the original invoices may be corrected, or, more commonly, copied in the final form. It

may be cheaper, unless changes of this sort are the rule, to throw away the original copies in a few cases, than to rewrite every invoice from the original order.

Factory Order

The factory or production order may utilize part or all of the following copies.

The *original* order may show the factory order number, a list of the materials and parts or subassemblies required (either directly or by reference to bill of materials and blueprints), a list of the operations required with machines at which performed, and, when available, standard operation times or piece rates, together with other incidental information.

Copies of this order may be sent to each *foreman* concerned, as advance notification, so that he can check materials and preparations.

A copy may serve as *requisition* for the needed materials, or separate requisitions may be made for each item, depending on whether material for the order is all picked and delivered in advance, or must be called for as needed.

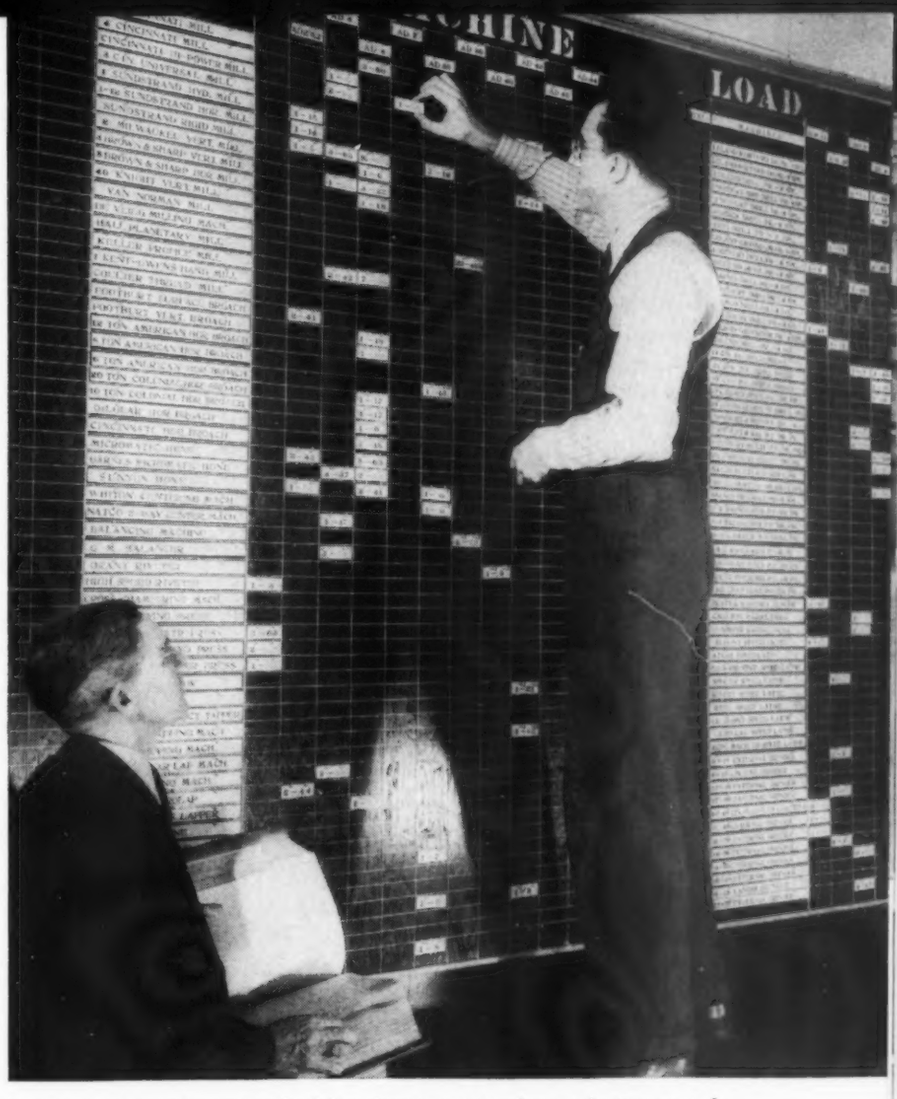
An *identification tag* is made for attachment to the material. It often shows the departments or machines to which the work is to be delivered.

A *tickler copy* of the order is retained by the planning department.

A *progress record copy* provides spaces for recording the completion of each operation, so that the progress of the order in the shop may be known at all times.

A *cost copy* provides spaces for entry of the materials and labor expended on the job. If posting is kept up to date, this copy may well serve as the progress record.

Time cards and *requisitions* may be partially preprinted. Requisitions are usually not sent out until the follow-up man or expediter receives notice that material is in stock. Time cards are given out as each operation is completed, being held in an open file by order number as needed. Or time cards may be written by the man, the foreman, or a clerk, as the work is done.



Machine load board permits scheduling department to plan production according to capacity. First figure on card is number of machines in department; second is hours scheduled. Black or red for first figure indicates general or single purpose machines; for second figure, no overload or an overload

. . . planning COORDINATION

Centralization. As the size of an operation increases, there is a tendency for clerical, handling, and control costs to multiply. More elements of the operation must be handled by interlocked routines, carried out by people who understand only their part. If anything goes wrong, or if a situation comes up which is not covered by the routines, trouble ensues. More people must be employed to supervise, and, in turn, the problem of coordinating supervisors and all the activities multiplies.

Usually the most important reason for centralization is to make possible, by concentration of all the work or product of a given kind, a volume sufficient to make good use of large and costly equipment or of fully functionalized organization or plant. But, as in the case of the economic lot size equation, there is here again a balance of costs and a point of lowest cost. First, there has been a trend toward the setting up of straight-line units, even when small and not as completely functionalized as the conventional operation, in order to take advantage of the simplicity of this plan of production control. Second, there has been a tendency toward replacing the tremendous plants of the past (although these continue to be built,

where process requirements indicate) by smaller plants, each a self-contained unit for the manufacture of a single product or part.

There are two ways of controlling production. One is to bring all scheduling decisions and dispatching to a single central point, where, by means of planning boards and records, the situation is constantly followed and controlled in detail. The other alternative is to plan at central headquarters only in terms of total capacity — the machine-hours of work scheduled for a machine or department, for example, and to leave it to the local superintendent, general foreman, or foreman to arrange the work in his own way, so long as he meets delivery dates. Use of the latter method obviously leads to a reduction in paperwork, communication, and superimposed controls, and to better adjustment in detail to the situation as it develops. (Who at headquarters would know that a special tool could be used only on one of the battery of otherwise identical lathes?) Decentralization has the further advantage of multiplying the participation in the control processes of the men down the line and making the work more interesting.

. . . planning STABILITY

In the electrical industry, load factor is defined as the ratio of the average use of a facility to its capacity. The term may be applied with advantage to production planning.

In the days when labor was cheap and custom permitted indiscriminate hiring and firing, and when equipment was simple and relatively low in cost, not much attention was paid to load factor. When the peak season came, everybody worked overtime and new men were hired in numbers; when the dull season rolled around, the employer selected the best of his men and let the rest go, and put the plant into semi-hibernation until the next peak season.

Complete security and unvarying routine are probably not good for humans, and the present union drive for seniority, equality of pay, and lifetime jobs, regardless of productivity, would probably in the end demoralize workers, if competition with other and more industrious nations did not catch up with it before it had a chance.

But the opposite extreme—complete insecurity, periodic long seasonal unemployment, deterioration of skills, and worry—is worse. As society comes to assess the cost of the insecurity of workers, it becomes increasingly difficult and costly, even for employers who feel no social responsibility, to work on a marked seasonal or sporadic basis. Increasing costs of plant also point the economy of a high load factor. Perhaps the ideal working program would be one that kept the plant working at capacity for say eleven months of the year, with an annual slackening which gave opportunity for vacations, inventorying, and deferred maintenance, and for the letdown that may well precede another burst of sales and production effort by all concerned.

TWO POSSIBLE WAYS

There are two ways to keep a plant busy. One is to make up to stock; the other is to diversify the line. Manufacture to stock is used to some extent by nearly all manufacturers to take up minor slack periods in operation, but the risk and capital requirements involved in making up ahead for any large period, are such as seriously to limit the application of this method of improving load factor.

Desirable though the objective of steady operation is, we cannot develop a diversified line simply by resolving to do so. Suppose a company made industrial furnaces; domestic heating furnaces, using many of the same processes, would seem like a natural development. But the selling problems are quite different; one is sold to producers, the other to consumers, with all the differences in trade customs, means of reaching buyers, and other elements which are involved.

A manufacturer of laboratory equipment, seeking to keep his force busy during the slack season, added manual training benches. Both products were of wood, and both reached the same general market—schools. But the manufacturer found that, if his skilled men tried to produce to the much lower tolerances and workmanship required for the manual training benches, either the costs were prohibitive or the men lost the careful work habits required for the production of the laboratory equipment.

The problem of finding the right products for diversification is not simple. The new product must:

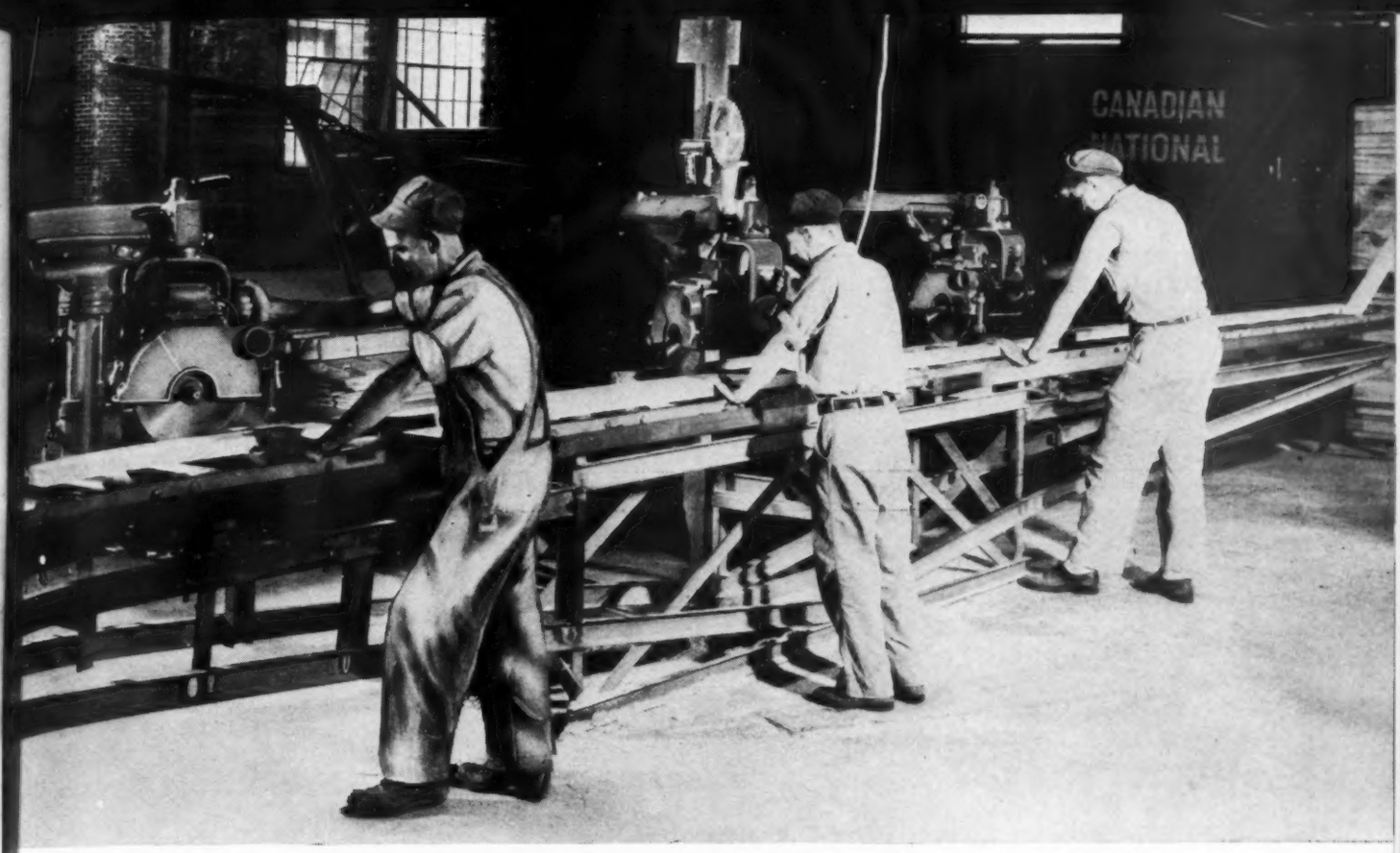
1. Utilize existing plant and personnel to a worth-while extent.

2. Its season of peak demand must not overlap that of the primary product. Preferably, the two products should have different cyclic characteristics; for example, the sales of work shoes or of gasoline do not suffer as much during business recessions as sales of luxuries or capital goods. This is perhaps a reason why, some years ago, the manufacturers of large electrical machinery embarked extensively in the sale of consumers' items.

3. The demands of the proposed line must be within the capacity, or must not cause an undue expansion and change in the capacity, not only of the shop but also of sales, engineering and other departments.

4. The new line should not compete injuriously with the principal line, nor involve commitments (as to local exclusive agencies) incompatible with existing ones.

5. A line added to an existing line partakes somewhat of the nature of a byproduct—that is, it presumably utilizes some capacity otherwise wasted. One must envisage the possibility that the byproduct line might sometime, however, have to stand on its own feet, cost-wise, and should not let the new line become parasitic on existing business.



GRAVITY ROLLER CONVEYORS LEADING TO SAWS PLACED IN PRODUCTION-LINE SEQUENCE REDUCE HANDLING COSTS BY HALF

DOUBLED PRODUCTIVITY BY GOOD HANDLING

That the rewards of work simplification efforts are not limited to large mass-production industries, is a well-known fact. But here is added proof that no company is too small to re-study its operations for profitable savings

Until recently, saw cutting of framing studs, rafters, and floor joists, used in the manufacture of prefabricated wood garages and 2- to 4-room bungalows at Well Built Manufacturing Company, Somerville, N. J., was thought to be as efficient as anyone in this industry could expect. But it did not satisfy Well Built's owner, or the working supervisors of his 30-odd employees.

By introducing several lengths of gravity roller conveyor, and ganging up three table-type radial saws in production line sequence, these results were achieved:

1. Over-all cost of cutting studs, rafters, and joists was reduced from $300 to $90 for a 30,000-ft. carload of lumber.

2. Waste in lumber was reduced from 10 percent to less than 1/10 of 1 percent.

3. Handling costs were halved.

Under the old method, a carload of lumber was unloaded by two laborers and sorted into piles according to lengths. Later a motor-powered lumber crane-truck moved each pile over to the sawing machine. Each piece had to be handled manually to the saw table. Cut pieces were stacked by hand on skids, which were taken away by the crane-truck.

Short left-over lengths went with the scrap, because of excessive costs of rehandling the sticks and resetting the machine.

Production averaged 120 studs an hour, or 960 a day, for one operator and one machine. Total handling costs were close to $4 per thousand board feet.

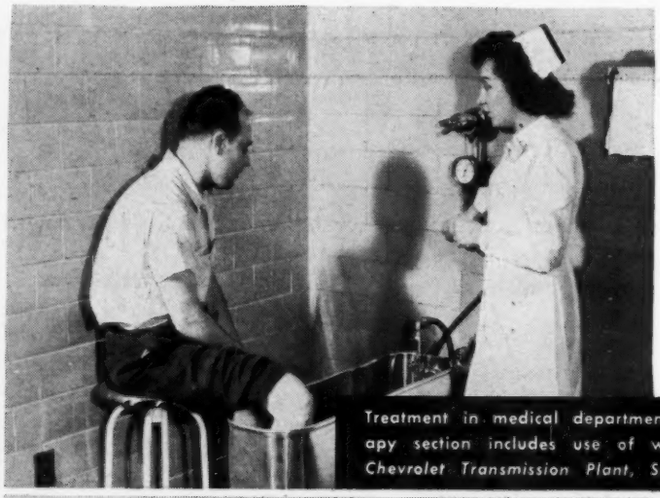
Now the car is spotted directly at the foot of the roller conveyor table leading to the three-machine production line. One laborer inside the freight car unloads the lumber at the door, where another laborer assists in laying it on the conveyor and guiding it to the saw tables. Three sawyers progressively cut studs on machines spaced to handle economically any length that comes along. Regulation of saw-table spacing by hand-wheels allows changes in piece lengths to be made quickly.

Short lengths are immediately cut into usable gable studs. One laborer stacks all cut lengths on skids, and the crane-truck takes them away as before.

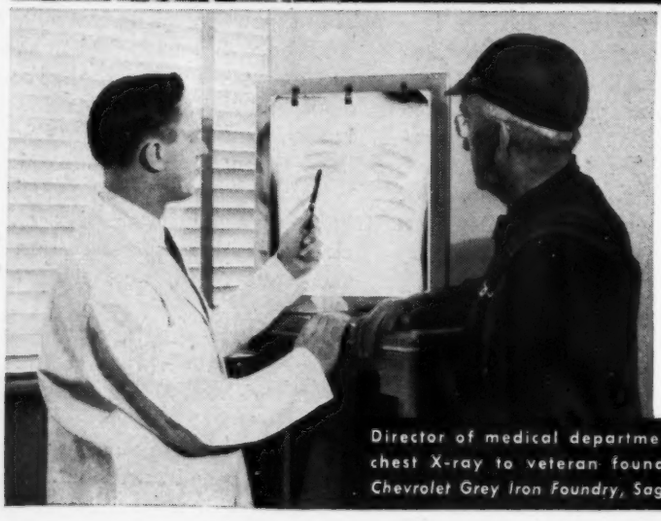
With three men operating three saws simultaneously, production averages about 5140 studs per day, or more than 1710 studs per operator. Total handling costs are about $2 per thousand board feet.

HOW GENERAL MOTORS INSURES WORKER HEALTH IN ITS 91 PLANTS

A complete medical department serves employees, with doctors and registered nurses in attendance. *Cleveland Diesel Engine Division, Cleveland*



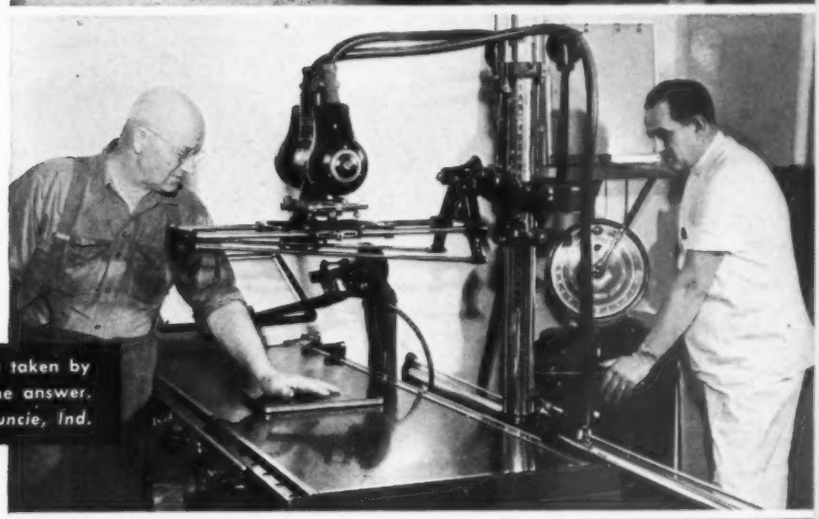
Treatment in medical department's physiotherapy section includes use of whirlpool bath. *Chevrolet Transmission Plant, Saginaw, Mich.*



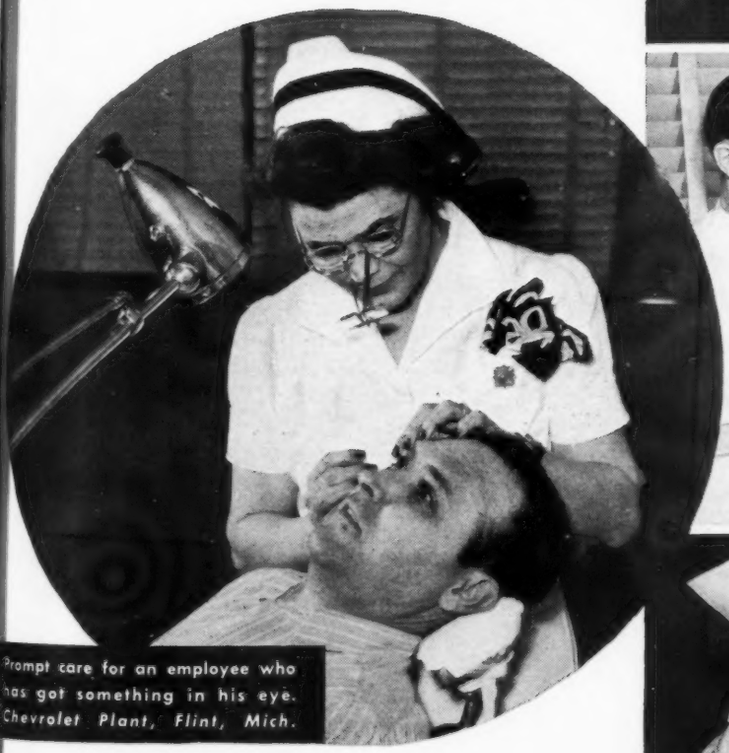
Director of medical department explains chest X-ray to veteran foundry worker. *Chevrolet Grey Iron Foundry, Saginaw, Mich.*

Photographs on these two pages were taken in 8 of the 91 medical departments operated by General Motors Corporation. They attest to the general excellence of the corporation's health and safety program, and serve in a measure to explain why it has been possible over the past twelve years to halve not only accident frequency and severity but also occupational injuries and illness. Good as this record is, however, GM is not stopping there. According to H. W. Anderson, vice-president in charge of personnel, the corporation plans to set up in-plant physician training centers in seven main manufacturing areas. Recently graduated physicians will be selected for training at these centers and thus prepared for industrial medical careers. Those who attend will receive special instruction in industrial hygiene as well as in industrial medical techniques. Main objective will be to instill in their minds the importance of sickness and accident prevention. Upon completion of their training, they will be free to remain with GM or go elsewhere.

Skilled medical care, up-to-date equipment characterize this medical department. *New Departure Division, Bristol, Conn.*



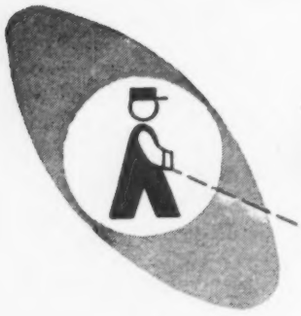
Was his hand injured? An X-ray taken by an expert technician will give the answer. *Chevrolet Transmission Plant, Muncie, Ind.*



Prompt care for an employee who has got something in his eye. *Chevrolet Plant, Flint, Mich.*

Technician conducts a basal metabolism test for a worker. *Buick-Oldsmobile-Pontiac Assembly Division, Linden, N. J.*

Department is equipped to provide expert medical services—even so, small injuries are dealt with as seriously as major ones. *Fischer Body-Ternstedt Division, Detroit.*



Looking Ahead in Labor

last-minute round-up as we go to press . . .

John L. Lewis's "insurrection" removed any possible doubt that Congress will pass strike-control legislation. Only questions: (1.) How far will it go? (2.) Can it be effective?

Republicans, supported by many Democrats, contemplate quick action on Case Bill. But last spring's omnibus bill may be split in two.

One part would provide for the Federal Mediation Board and cooling-off periods. This is close to what Truman asked a year ago and should get his okay. A second bill would cover suits for breach of contract, bans on secondary boycotts, joint management of union welfare funds, and removal of foremen from coverage by the Wagner Act.

Other legislation may take longer. Under consideration are changes in the Wagner Act that would establish unfair labor practices for unions, grant employers more freedom of speech.

Senator Ball predicts his anti-closed shop proposal will be most popular bill in Congress. He prefers outright closed-shop ban rather than detailed regulation of unions which would invest more powers in some government bureau. Bans already exist in four states.

•

Industry-wide bargaining with union monopolies poses the toughest problem, because it brings industry-wide, rather than local, strikes.

When they occur in basic industries like coal and steel, the country's economy is endangered. Solutions mentioned include compulsory arbitration, application of anti-trust laws, and drastic regulation of disputes to discourage industry-wide bargaining.

Any or all of these legal provisions, if adopted, won't eliminate strikes. But they could reduce the number and minimize their effect. It took less than 11 months of 1946 to break two strike records. The 4,095,000 workers on strike through October approached the old record of 4,160,000 set during 1919. Record fell in early November.

The 1945 record of 38,025,000 man-days of work lost by strikers was shattered much earlier. By October's end, work-time lost had reached 102,525,000 man-days.

Proof of the size and power of unions is given by a Bureau of Labor Statistics strike report covering the first year after V-J Day. Of the 4630 strikes, 42 of them involved 10,000 or more strikers, or 60 percent of the 5,000,000 workers on strike.

Besides the obvious conclusion that the strike situation couldn't get any worse than it was this year, strikes should decrease next year for many reasons. These include the new legislation, low union treasuries, and wages already lost by workers through their own strikes and layoffs caused by the coal stoppages. Both CIO and AFL leaders talked down strikes at their conventions.

Other factors: Growing realization in organized labor of need for high level of production and Veterans Administration decision denying veterans' unemployment compensation to veterans who were idle during General Motors strike, in which they had an interest.

Desires for uniform wage increases by CIO unions and increasing jurisdictional conflict will add pressure for strikes. Murray is convinced that the AFL, Lewis in particular, is out to wreck the CIO. A sore spot is recent inclination of National Labor Relations Board to carve craft units for AFL representation out of industrial units represented by the CIO.

•

CIO still argues that wage increases can come out of profits, ties its wage kite to the cost of living.

AFL looks at production, says productivity has risen enough to permit wage increases without increased prices. AFL advises its leaders to ask employers for financial reports, then cooperate to improve production. This adds up to more union demands that companies lay all their books on the table.

Groundwork is being laid for establishment of a Labor Extension Service in Department of Labor. Several bills, introduced near the end of the last Congress, undoubtedly will go in the hopper again. Meanwhile, the department's Labor Education Service functions under an advisory committee of CIO and AFL members. It will assist unions, colleges, and others to organize labor education programs and publish articles by recognized experts.

Aware that the Communist tag hurt PAC's effectiveness in last month's elections, the CIO made a gesture of cleaning its hands at Atlantic City.

The resolve to "resent and reject" Communist interference in CIO affairs shouldn't fool anybody, however. Even the Communists supported this declaration. CIO right-wingers will learn that red spots don't come off easily.

Looking Ahead in Business

last-minute round-up as we go to press . . .

Gong for second round of post-war labor-management contest was rung by John L. Lewis just as industry was hitting its full stride. The Federal Reserve Board's index of over-all industrial production climbed to 182 in October, an advance of 12 percent since January.

Despite strikes, shortages, and government controls, production of durable goods in October was 25 percent above the average for the first half of the year. New peacetime production records were broken left and right just before the miners walked out.

More civilian trucks were turned out in October than ever before. At the same time, new records were hung up in farm machinery, fractional-horsepower motors, radios, washing machines, electric and gas ranges, mechanical presses, and a host of other products. And by the middle of November, automakers hit a pace slightly above 1941 as 94,973 cars and trucks rolled off assembly lines in a single week.

Consequently, because production is moving along at a good clip, there are some ways in which industry is in better shape to withstand a strike siege now than it was a year ago when the first round was getting underway. Then the job of rearranging assembly lines had just been completed. Stocks of materials and parts were at low ebb. Almost every tie-up stalled assembly lines somewhere.

•

Now, however, manufacturers' inventories are at the record level of around $20 billions (almost half again as high as in 1941 in dollars and perhaps a quarter larger in volume). Thus production can go on for a time even in face of hold-ups in the flow of materials and parts.

Fact that the over-all inventory position is comfortable doesn't mean that industry can ride out strikes without any bump at all, however. In the first place, inventories are badly balanced so that strikes will hit hard if they shut off the flow of bottleneck materials and parts.

The nation's coal stocks, for instance, totaled less than 34 days' supply when the mines shut down, as against a 48-day supply at the start of the last strike. And industry's position is even more precarious in sheet steel, castings, copper, and similar tight items.

In the second place, prolonged strikes would deplete stocks rapidly because manufacturers' inventories amount to only 1½ months' shipments at the October rate.

All this adds up to the fact that, while industry enters the second round in better shape production-wise than at the start of the first round, prolonged strikes, particularly in basic industries, can throw industrial production for a serious loss. However, there is at least one dim ray of hope. *If, by some miracle, the second round could be settled with reasonable dispatch, industry could snap back quickly.*

•

Don't bank too heavily on the flat 20 percent cut in income taxes promised for next year. For one thing, the cut isn't actually as good politics as it sounds. This is because the same percentage for everybody means small dollar savings in the low and middle income brackets and large savings in the very high brackets.

A married person with two dependents earning $4000 would save only $1.25 a week and would still be paying 25 times the 1939 income tax rate. In sharp contrast, the $100,000 a year taxpayer would save $12,500. And people in the above—$250,000 brackets would actually pay less than the 1939 rates.

Then there's the question of how much elbow-room there'll be for tax cuts. *Most budget experts can't see how the budget can be cut below $33—34 billions. This would leave a margin of $6—7 billions for tax cuts—for present taxes will yield $40 billions if business activity holds up.*

But wartime excises go out automatically six months after the formal end of hostilities, cutting revenues $2 billions. The 20 percent cut in income taxes would slice off another $3.6 billions.

This would leave a billion or less to reduce the war-swollen national debt or to cushion the effect of a business recession on government revenues—and even a 5 percent dip in national income might cut tax revenues almost $3 billion, almost the amount of the proposed 20 percent income tax cut.

•

For these reasons, tax experts are taking a second look at the fiscal outlook to see if they can find some other formula which will give a little more relief to middle-income taxpayers and still stay within the limits of a balanced budget. But with a federal budget ranging upwards from $30 billions—almost four times pre-war—there isn't any way to levy taxes painlessly.

It's conveyors for both vertical and horizontal movements in Randolph Laboratories' five-story factory. They replace old elevator and floor truck method. Here, shown at the left, a vertical lift conveyor carries cut steel tubing from first to top floor of factory

HANDLING BY CONVEYOR IN A MULTI-STORY PLANT

AYRES BOAL, JR. • VICE-PRESIDENT AND PRODUCTION MANAGER
RANDOLPH LABORATORIES, INC., CHICAGO

Four times former output at one-half former cost is the present score at Randolph Laboratories. It constitutes proof, if proof be needed, that mechanization can help the multi-story plant whip its handling problem. It was achieved in this five-story factory by the utilization of conveyors for both vertical and horizontal movements.

Benefits include 60 percent more floor space for production operation, better working conditions, higher quality. Elevators have been freed. Many handlers have been transferred to productive jobs. And—especially important because many of the employees are women—the tasks of lifting extinguishers and moving heavy floor racks are now nothing but memories.

Skids, lift trucks, freight elevators, and large boxes were formerly used to move extinguisher cylinders and parts from floor to floor. On each floor, extinguishers were suspended on wheeled racks and thus transported to and from the various departments.

As expected, the problem of "vertical-flow" handling was a tough one. Randolph products range in weight from 9 to 125 pounds. Each

extinguisher must pass through 10 departments and 22 processes from the first floor level to the fifth floor and back. The entire assembly is handled at the plant, as are 80 percent of the manufacturing processes —including cutting, spinning, testing, heat-treating, shotblasting, filling, painting, labeling, and packing.

Production quotas were being met, but like all rapidly expanding plants, Randolph began to feel "growing pains." Elevators, which should service the shipping department 80 percent of the time, were overcrowded by interfloor product movements. There was a poor coordination between testing and process departments. Mobile racks cramped floor space. Valuable manpower was being wasted in uneconomical product handling.

Now women can label finished extinguishers without lifting or shifting units. Hook attachments carry extinguishers along, and swivels permit them to be turned in any direction without undue operator fatigue

CONVEYORS

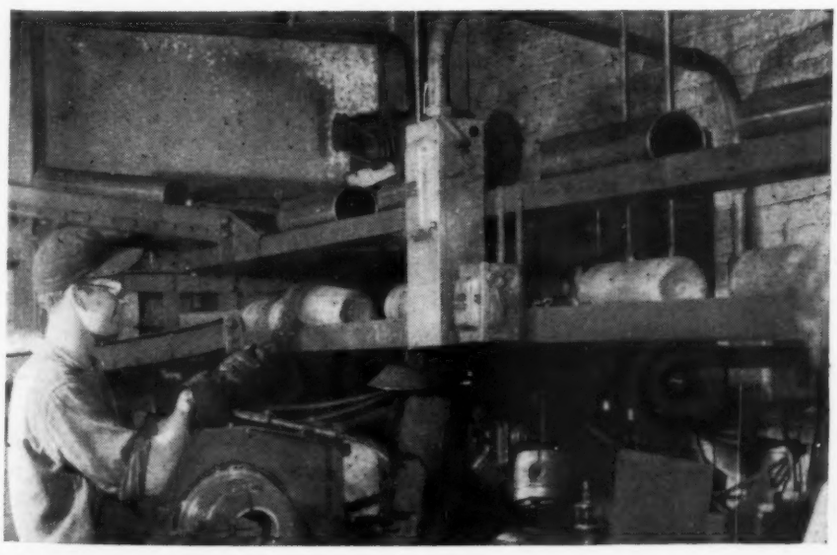
These problems were solved, in a relatively short time, by the carefully planned installation of a conveyor system—a continuous line that runs vertically and horizontally, using hook, U, and lift types of conveyors, from the first floor level to the top flight, and down again.

A vertical lift conveyor carries the cut cylinder tubing from the first floor to the fifth, where the steel tubes are automatically spilled into a 4-in. U-type horizontal conveyor. From there they pass into the spinning department and are removed from the conveyor, where the ends are spun into cylinder shape. Speed of this conveyor is so timed that spinners are not swamped, nor can they lag in output.

This U-type conveyor has a double track. The lower track carries the spun and machined cylinders in one direction. The top track runs in the opposite direction. Thus two conveyors do not occupy additional space. After a run through the heat-treat furnace, oil quench tank, and draw furnace on specially designed heat-resistance chain belts, a plate conveyor carries the units, lying flat, to the opposite side of the floor, where they are drilled, tapped, machined, tested, stamped, passed on conveyors, and run through drying and shotblast equipment.

While the top floor is occupied with cylinder preparation, the fourth floor valve department assembles extinguisher valves, triggers, and syphon tubes, hooks these parts to a conveyor, and sends them up to the fifth floor to the cylinder valve connecting department. This department utilizes the junction of the separate conveyor systems to connect the cylinders to the valves, and sends complete extinguishers back to the conveyor line, where they are filled with liquid carbon dioxide. When filled, extinguishers pass by conveyor through a prime coating spray booth, are automatically lifted overhead and dried, then moved down to eye level in a long middle aisle between two rows of testing tanks.

From vertical lift, cylinders automatically spill into a horizontal 4-in. U-type conveyor, which moves cylinders through machining operations. Double track arrangement accommodates two conveyors in the amount of floor space usually occupied by a single line



The testing of extinguishers in warm water is a 4-hour process, and is closely supervised by the Underwriters Laboratories and plant engineers. This important phase of production cannot be rushed; consequently the conveyor system must move at a slow speed, while the testing department keeps units flowing in and out of the test tanks. Extinguishers that have been tested and okayed are placed on every other hook of the conveyor, which cuts down to the lower floor, where units are given their final spray coats of red lacquer and aluminum.

To insure production coordination between floors, each department has a stop-and-start emergency control. Should one department suffer a sudden breakdown or lag, it can instantly stop the entire conveyor line by pushbutton, until the trouble has been cleared up. In this way, pile-ups and confusion are avoided.

WHAT WE HAVE LEARNED ABOUT UPKEEP OF PYROMETRIC EQUIPMENT

P. L. STAPLETON • WORKS LABORATORY, GENERAL ELECTRIC COMPANY SCHENECTADY

If you cannot repair it quickly on the spot, install a replacement instrument to keep production going and take the bad one back to the laboratory, where a real repair job can be done.

That is the theory behind the maintenance procedure for the 2400 pyrometric and measuring instruments—thermometers, pyrometers, and potentiometers—at General Electric's Schenectady plant, where 40 years of preventive maintenance experience, plus a lot of special instruments and procedures, keep failures of such equipment at a minimum.

The replacement philosophy is one of the most basic in the whole maintenance organization. Several replacements are kept on hand for each type of instrument and they are substituted immediately for those that fail, if the service required is anything but the most basic.

This practice saves a great deal of time, prevents the loss of production that would result from trying to repair a major failure with portable facilities, and assures adequate repairs so that similar causes of future failure will be eliminated.

So complete are the main laboratory repair facilities that of all the instruments in active service today, office records a year from now probably will show that less than 1 percent have had to be returned to the manufacturer for servicing. All the work is done with a force of nine instrument technicians and one supervisory engineer.

Key to the success of the instrument maintenance program is threefold: A long-range program of standardization that began 20 years ago and is still continuing; increasing cooperation among the purchasing department, production departments, and the maintenance section on the selection, purchase, installation, adaptation, and use of instruments; and an elaborate filing system.

When the program began there were instruments of practically every type and make in the Schenectady Works. Supervisors and department heads often bought their own pyrometric equipment without taking into consideration maintenance problems and operating conditions.

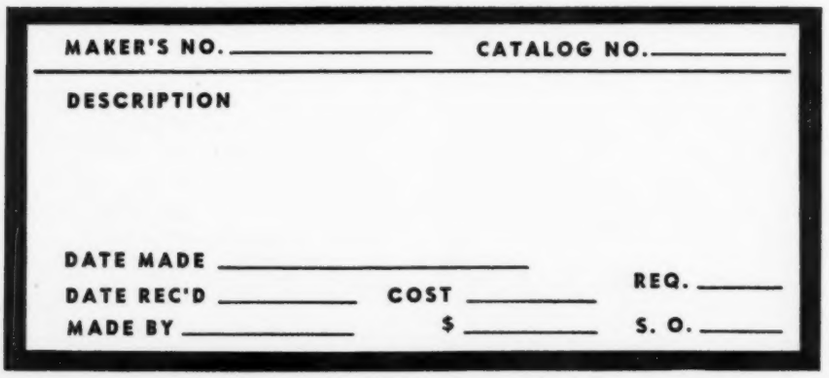
Today the variety of temperature-indicating instruments has been so reduced that requirements for more than 1100 millivolt pyrometers, for example, are satisfied by the purchase of only two types of instruments.

This standardization has greatly reduced service time. Repair parts and materials for those instruments can be ordered in quantity, since it is assured that they will be the only types needed. Maintenance workers can become thoroughly familiar with the two instruments in a much shorter time than they could with the multitude previously used and therefore can make repairs quicker and more efficiently.

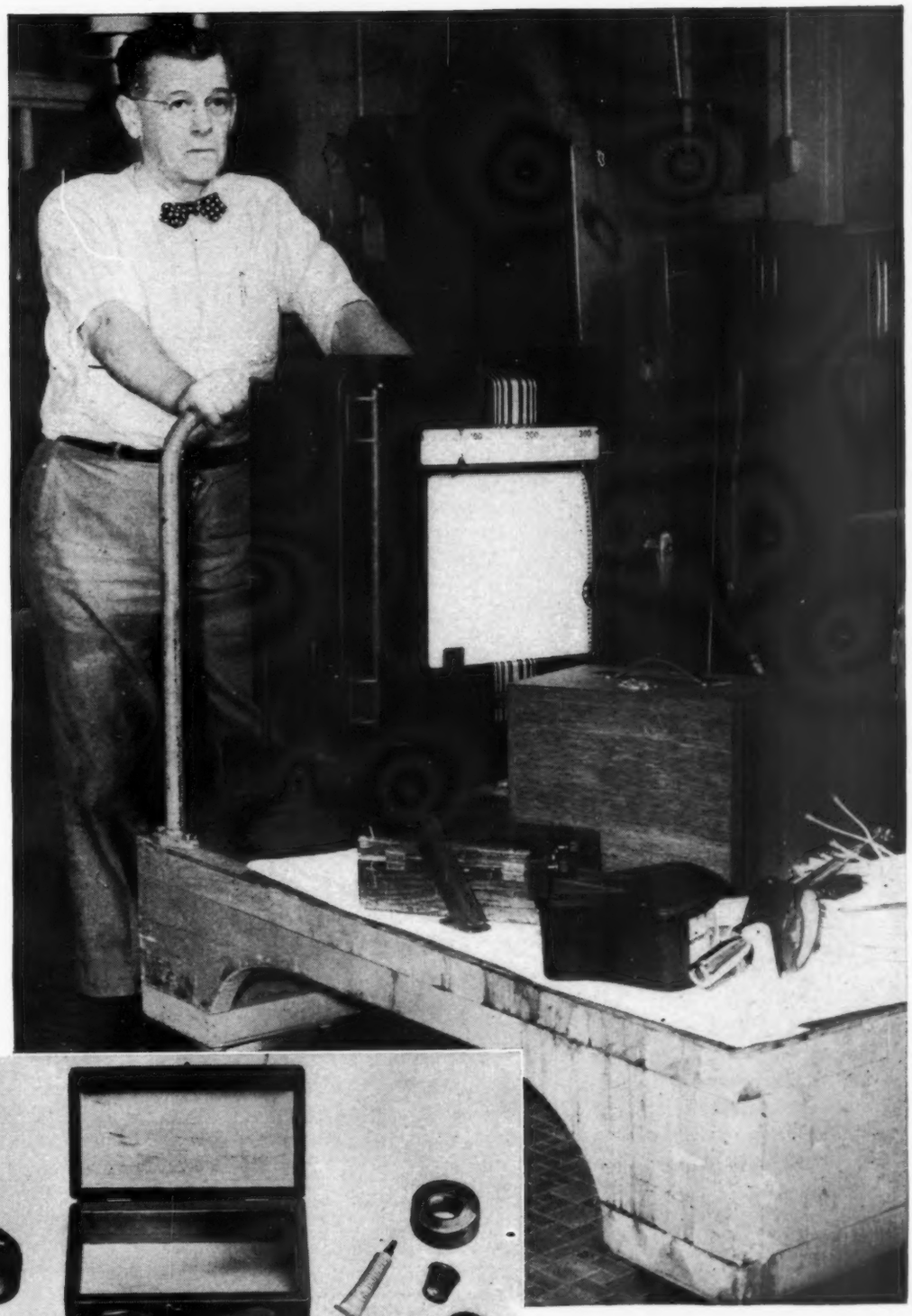
When new pyrometric installations are contemplated for any process, consultations and recommendations are in order with all interested departments to assure that the correct type of instrument is chosen. These recommendations are always made with the standardization program, as well as the maintenance and serviceability of the instrument, in mind. The section also adapts standard instruments for special applications, and tests all new pyrometric equipment as it comes on the market, to determine its potential usefulness.

The filing system takes charge of an instrument the day it enters the plant and at a glance gives its exact location and condition. A series of cross references minimizes record-searching time.

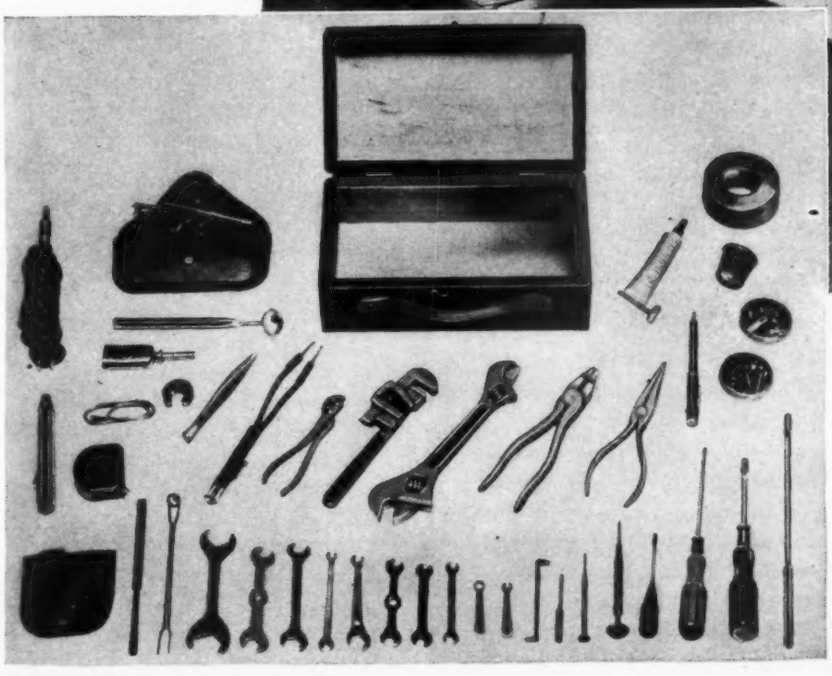
The master card gives technical information on the device; special details concerning its manufacture, use, or service; date of receipt, checking, and calibration; and a catalog number. This number, assigned by the section, is always used in referring to the device and is stamped on a metal plate fastened to the device itself. The master



MASTER CARD GIVES ALL INFORMATION; IS FILED NUMERICALLY FOR QUICK FINDING



Heavy instruments, test sets, tool kits, and replacement parts are transported around the plant on a rubber-tired truck which was built especially for that purpose



The repair kit used by service men in the pyrometric section of the works laboratory contains the tools and other items shown

All pyrometric equipment in the plant is inspected at least every three months, oftener if necessary, by a two-man team. Three teams are required to handle the 2400 instruments in use

cards are filed numerically by this identification.

Another card contains identical information but also shows in the upper left-hand corner, the building in which the instrument is used, and if necessary the location in the building. These cards, filed also by number and type, are placed in a section of the file if the instrument has been returned to the laboratory or manufacturer for repair, or has been scrapped.

Thus, checks can be made by building, and catalog number of any instrument in the works.

To keep the devices working properly involves a system of constant supervision and inspection. Of the nine men in the section, six in groups of two each make periodic calibrations and inspections, while three are available for day and night emergency calls.

Present schedules call for the inspection and calibration of every instrument at least once every three months, and oftener if needed. A complete record is always made of these investigations, and a copy sent to the head of the department involved. This record indicates the calibration efficiency and by what amount it varied at the check points, before the corrections were made. If the instrument is a controller of the filled-system type, the contacts are cleaned and adjusted, tubing and bulb are checked and, if the bulb is located in an oven, the position is verified to assure correct indication.

With pyrometers, new thermocouples are always installed and the extension or compensating leads replaced if necessary. The additional expense of replacing thermocouple wires is justified by the fact that the individual cost is small, since the wire is bought in quantity and covered by the company's cable department to maintenance section specifications, and by the increased efficiency that results. Connector blocks are also tightened, and the polarity of the circuits is checked.

In the event of breakdown or faulty operation, the inspection routine outlined in the table on page 143 is followed to find the cause.

The tools carried by the inspectors include those commonly used by instrument workers, plus some special types developed by the section. An example of the specialized equipment carried is a small tank for testing and calibrating thermometers. Plugged into any electrical outlet, it boils water quickly and a thermometer can be tested on the spot.

Spare parts carried include thermocouples in a variety of sizes, types, and insulations; compensating leads, coils, connector blocks, mercury switches, instrument motors, spring-wound and electric clock drives, batteries for potentiometer instruments, cutters, ink pads, inks, oil, greases, insulators, fuses, pens, and chart paper.

If an instrument that needs attention cannot be repaired at the scene in 10 or 15 minutes it is removed and returned to the main laboratory where there is sufficient equipment to do just about any job that might appear. Within obvious limitations, instruments can be completely rebuilt if necessary. The more important equipment available includes:

Three platinum, platinum 10 percent thermocouples with Bureau of Standards calibration.

One tripod and voltage-regulating device for annealing platinum thermocouples.

(Complete facilities of the chemical laboratory are also available for cleaning platinum.)

Two high-temperature furnaces for check calibrations of thermocouples and instruments.

Two high-temperature nichrome-wound furnaces for check calibrations of thermocouples and instruments.

Two portable tanks for liquid-bath checking of thermometers in laboratory and factory.

One calibration set for checking optical pyrometers, with two spare calibrating lamps.

One hot plate equipped with voltage regulating control, for checking surface-contact pyrometers.

One special bench with air supply for servicing and checking pneumatic controllers.

One carbon arc welder for welding all types of thermocouples.

One instrument wagon.

One 1½-ton truck.

Three workbenches for instrument repairs.

Two precision potentiometers.

Four test sets used for periodic calibrations in the factory.

Two six-point strip chart recorders with parts to change the ranges and chart travel (used for temperature explorations).

Two circular-chart single-record instruments with parts to change the chart drive for temperature explorations.

Five portable potentiometers, each calibrated for different types of thermocouples.

Eight portable millivoltmeters, each calibrated for different types of thermocouples.

One potentiometer-type optical pyrometer and one photometric-type optical pyrometer.

One master surface contact pyrometer and one G-E multimeter and circuit analyzer.

One resistance bridge.

Standard spare parts are purchased in quantity from manufacturers, and materials for other parts and supplies, such as thermocouple wire, are bought from wholesalers who build them according to General Electric specifications. The thermocouple wire is coated by the company's cable division, with colored material, according to a code that has been standardized for different alloys.

To keep these materials and parts immediately available, cabinets of special design have been built.

In order to facilitate the selection of materials and parts available for instrument maintenance purposes, a board has been set up that contains samples of the items most commonly used. Thus, it is easy to indicate to production engineers the type of material and equipment that should be used on any installation.

HOW TO LOCATE TROUBLE IN PYROMETRIC EQUIPMENT

FOR ALL CONTROL INSTRUMENTS IN GENERAL

Instrument not operating	Test for power. See if motor is operating. (It may be burned out or the mechanism jammed)
Instrument operating, but main power contactor fails to close	Remove the three (high, common, and low) control wires from instrument and in turn connect the high and low with the common. If power contactor operates properly and heating elements in furnace or oven get hot, the trouble is definitely in the instrument
If instrument still operates and contactor does not close	Check contacts or mercury switches in instrument

IF THIS CHECK REVEALS NOTHING WRONG

1. Discuss instrument in question with operator in charge, and check process specifications
2. See that cams, pointers, and moving parts are moving freely
3. Clean slide wire and check galvanometer
4. Check need for lubrication
5. See whether subsidiary devices—oven coils, relays, other elements—are functioning
6. Check noticeable failures or irregularities in instrument. (Some instruments have certain weaknesses of design that may cause failure of other parts)
7. Standardize battery

For specific instruments:

MILLIVOLTMETERS

1. Check lead and connector block of thermocouple
2. On the instrument itself, look for (1) sticky points on scale or case; (2) dirt in the moving element; (3) loose connections; (4) twisted hair spirals; (5) bad pivot or worn jewel

MILLIVOLTMETER CONTROLLERS

Do as directed above, but also look for (1) faulty motor; (2) defective mercury switch; (3) sticky separation of mechanical parts of control instrument; (4) defective tubes in electronic control unit

POTENTIOMETERS

1. Check thermocouple lead wire and connector block
2. Determine whether galvanometer is sticking or burned out
3. Check for dirty slide wire
4. Inspect for dirty contacts in instrument
5. Check for improper inking, or faulty pointing and indicating mechanism
6. Look for defective chart drive
7. Examine for sticky balancing mechanism
8. Look for motor trouble
9. Test for weak battery
10. Inspect for dirty or defective rheostat

DECENTRALIZATION IS DOING THINGS FOR THESE INDUSTRIAL CONCERNS

Discovery of a few of the simplest little facts of life, as they affect people in the world of business and industry, is in the process of causing big units of enterprise to take themselves apart physically for the benefit of their own management, their stockholders, their workers, their customers, and the country in general.

All of this is taking place under the heading of *decentralization,* which, like any new concept, means a lot of things to a lot of people. In reality there are all grades and shades of decentralization produced by such diverse causes as company mergers, subcontracting patterns, sheer outgrowing of old facilities, changes in matters of supplies, markets, and methods, acquisition of new products and lines, carefully planned and engineered increase in production facilities, or pure patchwork.

Also present is the complicating fact that there can be: (1) Decentralization of physical plant and company structure; or (2) decentralization of management methods and controls.

Either one can exist without the other, and frequently does. As a result, there are more than a few companies that have acquired a decentralized plant structure, but fail to reap any of the potential benefits because they retain a rigidly centralized management policy. No matter what initial factor starts a company along the decentralization road, the end-results will proceed far beyond the mere spreading out of physical facilities. And if experience to date with decentralization is any criterion, the net effect of all these influences can be *good.*

To see *how* and *why,* let's take a look at the record.

Because industrial decentralization is a relative thing, no one can say that it began on a Thursday, 19xx, when the Widget Company decided to build a branch plant. Some companies have actually started out with decentralization as one of their first precepts. Others have had it forced on them as an *or else* proposition. For a first example, let's take a look at an experiment that began almost a score of years ago.

JOHNSON & JOHNSON

No new disciple of decentralization, but rather its chief apostle is Gen. Robert Wood Johnson, chairman of the board of Johnson & Johnson, Inc., New Brunswick, N. J. Having carried *physical* decentralization to the point where his company operates some of the country's most modern, efficient, and altogether "humanized" plants (each one employing fewer than 200 people); and having decentralized the *management* functions of his $100,000,000-volume-per-year company to the point where headquarters is only a "service management," Johnson now says, "It's fun again to be in business." His decentralized executive staffs and his employees seem to agree heartily, and even his competitors agree that he's got something there.

The moving force behind this company's decentralization was not so much outgrowth of facilities as it was a "paper pyramiding of management" to the point where Johnson was determined to "delete, delegate, decentralize, and, if necessary, delouse" his general staff until he got it back to the point where the accent in *man*agement fell on the syllable *man* and every worker in any given operation was a guy, not a gadget.

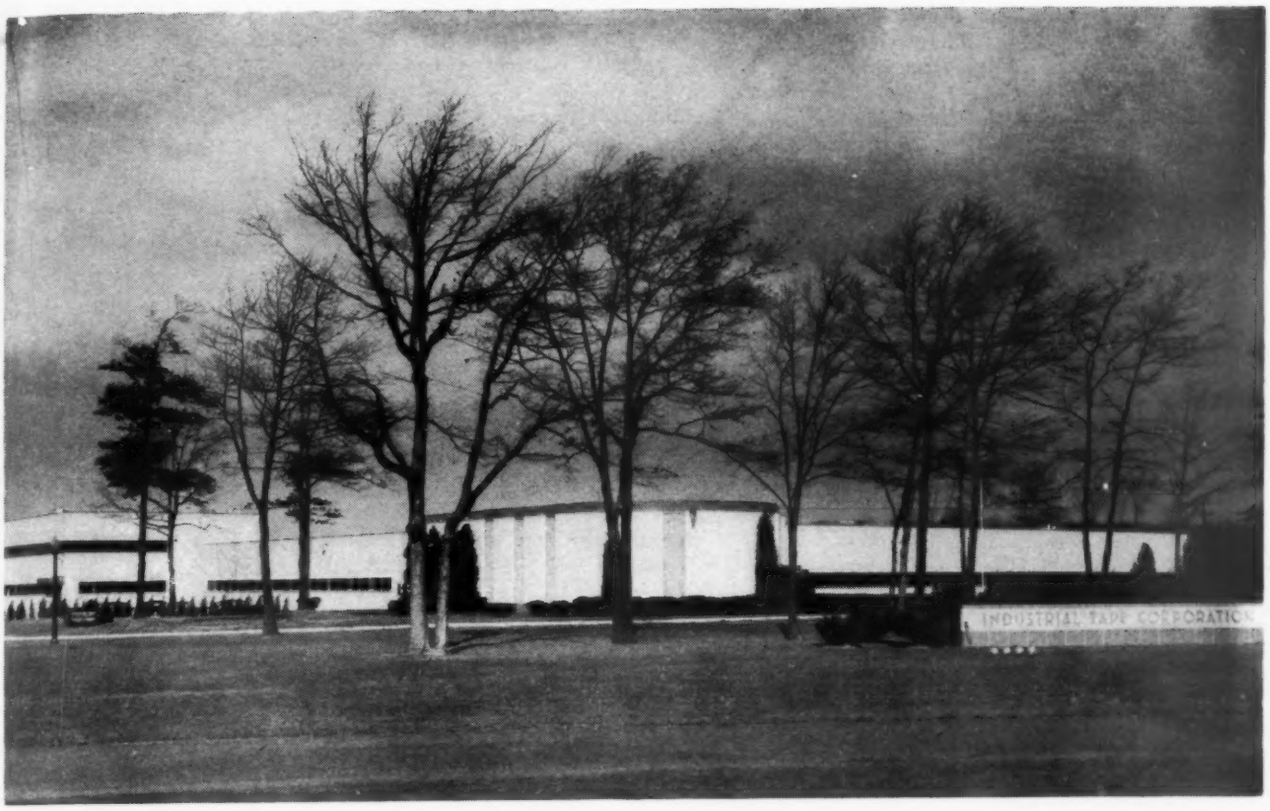
The General admits that it was a long, tough battle against the almost irresistible industrial trend over recent years to put everything under one roof. In the process the company even did such drastic things as buying a whole town in Georgia—330 houses, 3 churches, a store, and a mill—in order to see what could be done in the way of fitting a factory to a community environment. Between that event and the small but ultra-modern and self-managed J & J divisions—Personal Products Corporation, Industrial Tape Corporation, and Ethicon Laboratories, Inc.—setting back from U. S. Highway No. 1 near New Brunswick, each one on a landscaped carpet of lawn, lies 19 years of experience with decentralization. Today the Ethicon Laboratory, with its pink pastel glass-tiled lady's powder room and its radio stage from which workers put on their own soap operas on company time, may be just a little heady for some managements. But when asked if it really pays off, General Johnson simply hands over the post-war figures:

Increase in pay rates, 33 percent
Increase in production, 36 percent

The Johnson & Johnson decentralized units have been "taken out of the big tent" one at a time; and the size of each new unit is geared to what one man can fully comprehend and where all the workers can know one another by name, not by number like license plates. Each factor is virtually in business for itself, and both managers and employees are recruited and act accordingly. As a result, the top level J & J management, free of a great weight of housekeeping detail, is able to concentrate on the sort of thing top management gets paid for but frequently doesn't have the time to do. At J & J this includes pioneering new ways of restoring still more human values to the industrial process—i.e., figuring out how to make decentralization work still better.

STILLWATER

New England is studded with towns grown up around obsolete textile mills, each a depressing exhibit of what caused the germ of decentralization to sprout in the minds of progressive management men. But in welcome contrast to the average New England mill town is



Despite Johnson & Johnson's $100,000,000 annual volume, management functions have been physically decentralized to the point where, says the chairman of the board, it's fun again to be in business. Here, one of the less-than-200-man plants that symbolize J & J's longtime reluctance to put everything under one roof. In such a plant as this, every worker is a guy, not just a gadget

Harrisville, R. I., where for three decades the Stillwater Worsted Mills, Inc., has been creating a profitable and practical living monument to the benefits of decentralization. In fact the company now operates nearly a dozen such industrial monuments in New England and the South.

Perhaps the first fifteen years of this company's crusade against decadent textile mill town conditions could hardly be called typical of anything except a crusader. They began with devising tools to scrape tobacco juice off the floors and machinery, then proceeded through chapters of installing tiled flush toilets "just like New York hotels," and building prefabricated model homes that would grace the streets in any New England town. (The homes were manufactured by the company in an old abandoned textile mill and erected in mid-winter under a borrowed circus tent.) Then, sandwiched in between sweeping improvements in actual textile operations, came a legitimate theater where the employees produce their own plays, a new village hall, a new school—they moved the local river to make room for an adjoining athletic field.

If all this be philanthropy or paternalism, history will have to make the most of it, for the company went through the depression in the black, and has consistently produced premium products at the highest wages in the industry.

But, as might have been expected, the company soon outgrew its facilities, and since its president had a horror of big factories, decentralization seemed in order.

"No industrial unit," he declared, "should ever grow beyond the point where the person at the top can know not only the individual workers, but also their families."

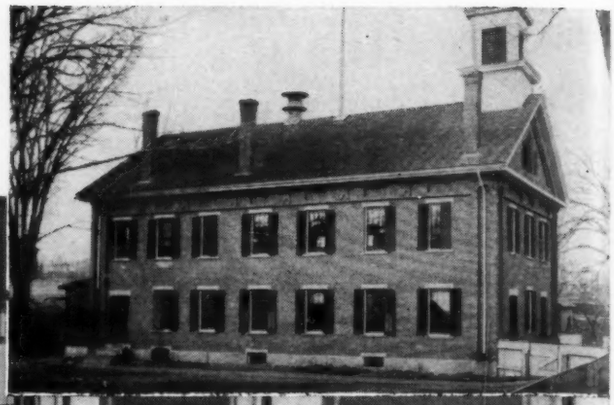
Beyond a certain size (so ran his thesis), not only are factories inefficient, but when they become really big, they baffle even the most sympathetic and intelligent management. Their great social error is that they disrupt established ways of life without the participation or consent of the people affected. Thus *communities* become *industrial centers.* And when that happens, a company loses the *animate intangibles* that spring from a small group of people working together harmoniously.

When, in 1924, the president suggested a branch plant, his staff opposed the idea because they didn't believe a branch could possibly meet the production efficiency of the home mill. However, they finally agreed to risk a few thousand dollars on expansion. But soon after they acquired an old mill at Ashaway, R. I., and had torn down tenements and junked old machinery, the same animate intangibles began to pay off again. Within a year the new mill was crowding the Harrisville home plant for top honors in low costs and high production.

By this time the management had begun to comment about the way in which young people were abandoning rural New England villages for Boston and other big cities. Why not build a mill in a town that had never had any industry before, and thus bring industry and agriculture together to their mutual advantage?

The tiny hamlet of East Woodstock, Conn., filled the bill even to

Once a schoolhouse. Now it's one of Textron's decentralized sewing plants. Located in Milford, N. H., it is a feeder plant for the Lingerie Division, whose headquarters are in Manchester, N. H. Quality of work and productivity in these small-town establishments have quickly matched the standards of comparable textile centers



the particular of having a nearby academy. But it was so small that the only regularly functioning community group was a literary society. The president therefore wrote a letter to the society arranging to meet the members and discuss the building of a small worsted mill in the village.

On the appointed evening the literary society met, read some poetry, and then listened to Stillwater's president expound his opinion and views on the social and economic implications of having a worsted mill in its village.

After thorough and dignified deliberation, it passed a resolution favoring the project. The new mill was built, employing the village people to the fullest of their capacity, including wiring by the local minister.

When the mill was finished, invitations to the dedication dance were issued by the Stillwater Worsted Mills and the East Woodstock Literary Society.

Today the highly efficient mill that turned out miles of cloth for the Army and Navy in its charming New England setting has a cornfield right up against the big windows on one side and cows staring curiously in from their pasture on another. The resident manager is one of the few "experts" who came from outside the village. All the other employees have been local village people who quickly learned the weaving trade.

In 1926 Stillwater determined to try a still more unorthodox industrial experiment. If the farm people of East Woodstock could build and operate a profitable mill and produce high-quality goods, why couldn't untrained people in a completely unindustrialized *area* do the same?

For an answer it scoured the southeastern United States until it found the three villages of Agusta Springs, Craigsville, and Goshen—all located in the remote Calfpasture Valley of Western Virginia. Here it built three plants, for yarn making, for weaving, and for finishing and dyeing worsted. They were completed just a few weeks before the market crash of 1929—which indeed put Stillwater's theory to the acid test.

Admittedly, it took a little time for the new mountaineer weavers to get used to the idea that you can't go rabbit hunting between bobbin changes. But the facts are on the books, in black figures, that those mills took the Calfpasture Valley through the depression, and they've never been out of the black.

Suffice it to say that the company now operates highly profitably and efficient decentralized textile mill units in New England and the South, each one limited to the "size of a man and his neighbors."

TEXTRON

In contrast to Stillwater's evolutionary approach to decentralization, the recent plant expansion history of Textron, Inc., is more in the nature of a simultaneous attack.

It began when Royal S. Little, Textron's president, voicing his faith in the future of New England before the New England Council, said he would like to find at least ten small towns in which his company could establish small sewing plants. Textron was swamped in virtually the next mail by more than 100 letters, some written on copy paper by small-town merchants, ministers, weekly editors, and just everyday citizens who felt that their towns were well suited to Textron's new decentralized needs.

Then began a period of screening in which company representatives met with townspeople at town meetings, in grange halls, and at sidewalk sessions to discuss available space, labor supply, and community relations in general between the town and its potential new industrial citizen. The town groups met Textron more than halfway in their willingness to make surveys of actual persons who would seek jobs in the new sewing plants, in expediting modification of available facilities, and so on. Textron in turn made clear its policies on wages, working conditions, and "company personality," even to the point of putting on fashion shows of the company's products. One of the biggest problems from the company's point of view was how to say "no" to the many worthy communities over and above the ten finally selected.

In the towns picked—of which South Gardiner and Brunswick, Me., Milford and South Franklin, N. H., East Greenwich, R. I., and Turner's Falls, Mass., are indicative—production space was most frequently acquired by refurbishing an old and idle mill (something invariably and strongly welcomed by the town), although an old schoolhouse and an unused railroad station were also metamorphosed into Textron sewing plants in the process.

Liberal applications of white paint and fluorescent light became a standard procedure in the remodeling process, and the communities were uniformly astonished at the speed with which modern machinery could be set up and put into operation, frequently in less than a month after the plant facilities were acquired.

These small decentralized sewing plants (100 to 150 workers) are now well past their shakedown runs, and both Textron and the affected communities seem uniformly satisfied with results. Quality of work and productivity have quickly matched and even exceeded standards of comparable textile centers. On the strength of its decentralization experience in New England, Textron is now proceeding with a similar program for small southern towns.

However, Textron's officials concede with becoming candor that there are *cons* as well as *pros* connected with such a decentralization program; and their evaluations of experience to date is both interesting and of potential value to other companies contemplating such moves.

They point out, with some amusing anecdotes, how easy it is for a company to fall into a squeeze play between local groups competing for the credit of having brought a new industry to town. They found also that, in the mutual enthusiasm of such a project, the amenities of working in the new plant can be oversold so that after production actually starts there is a period of letdown until new employees have been adequately trained and their earnings (particularly under piecework) begin to approach the levels established by experienced workers elsewhere. The company's experience also demonstrates that great care must be taken to think of everything in advance so as to cause a minimum of disruption to the economic and living patterns of a small community.

But on the plus side Textron's experience has revealed that because of the interest generated in a town by such a move, it is easy to get a hearing for all the facts, and that over-ballyhooing the event is neither necessary nor desirable. In this regard, events have demonstrated that the local newspaper editor, properly provided with all the facts, can serve as one of the more appropriate moderators of such a move. Local merchants and school, civic, and religious leaders of the community can also be provided with a keen and helpful interest in the new development. It is out of such interest that the local personality of the new industrial citizen grows—and the net result will soon show up in the balance sheet.

MUNSINGWEAR

But don't get the impression that decentralization is a special new panacea whereby the textile industry is revitalizing itself and the small mill towns in New England. Out in Minnesota where presumably there are wide-open spaces enough for the biggest industrial units, Munsingwear, Inc., is neck and neck with its eastern colleagues in sprouting roots in small towns.

When the pressure of war production began to overtax its Twin City facilities, Munsingwear went first to Montgomery, Minn., a village of 1100. Here the company acquired an old rambling dance hall and soon had it operating as an un-

Seamless nylon hose factory at rural Rogers, Ark., where the only other industries are a chicken-picking plant and a vinegar works. Nevertheless Munsingwear has been able to find workers in this small town who can be quickly trained to meet the high-quality standards it demands

derwear plant with 80 employees. Next stop was Little Falls where 175 newly trained textile workers are now producing corsets. This factory used to be an undertaker's parlor.

Then came Bemidji, where an ex-WPA building has become a Munsingwear brassiere plant. After that came the slip factory which took over the second floor of a gas and electric building in Albert Lea. Next stop was over the state line in St. Croix Falls, Wis., where some 60 new workers are operating a second decentralized underwear plant.

As with Textron, these branch Munsingwear units are all sewing plants where operations and techniques are fairly simple and standardized. But so impressed is Munsingwear with its experience in decentralization to small plants in small communities, that it is now building a brand new factory in Rogers, Ark., for seamless nylon hosiery. This operation (which is itself an outgrowth of a hosiery plant purchased in Des Moines last year) represents modern industrial expansion into a community which heretofore had only a chicken-picking plant and a vinegar works. Yet in Rogers, as in the small rural Minnesota communities, Munsingwear has been able to find high-quality potential workers who can be quickly trained to meet prior standards in the industry. The company is enthusiastic about the whole atmosphere of these small-town operations. And, as in the case of Textron, Munsingwear deals the whole town in on the problems of locating sites, recruiting workers, and making the new units industrially and sociologically successful. Moreover, Munsingwear has laid the cheap labor bogey by the heels as a criticism of such plant decentralization. It takes the unions right along and, indeed, has given them a large role in helping make the new units a success.

HEAVY INDUSTRY

Many managements have failed to take much interest in decentralization because of the psychological block to thinking about "moving any part of this great big plant or disrupting any of the management

Diamond-die polishing at Warren, Pa., wire products plant. By taking its plants where the workers are, Sylvania was able during the war to tap important new sources of labor supply, now finds its feeder-plant system of small plants in small towns the blueprint for current low-cost operation

policies which we have built up by trial and error over a long period of time." Yet this is frequently the very kind of in-a-rut thinking that has generated situations which can be cured only by liberal applications of decentralization—either of management, of plant facilities, or of both. And when the pressures so generated get strong enough they can cause, and have caused, even "heavy industry" to decentralize.

It took a lot of pressure to convince the motor car industry that automobiles could profitably be made somewhere else than in Detroit. Yet, when the break finally came, the scattering of automobile assembly plants proceeded so rapidly that the industry is now a sort of *Exhibit A* of decentralization.

In reality, the process would probably have proceeded even more rapidly if the companies had been able to decentralize their management functions as rapidly as they did their production facilities. It is only now in the post-war period that Ford is taking the lead in decentralizing such management functions as purchasing. (For a detailed account of the Ford plan, see *The Big Idea Behind Those Small Plants of Ford's,* FACTORY, April 1938.)

Nevertheless, the success of the automobile manufacturers is making it clear that even industries with heavy fixed capital investments can profitably read a page from the record of the break-it-up boys. So it is that a company in a basic industry, which operates units of even rolling mill dimensions, is spending $30,000,000 on decentralization, and its basic objectives are not unlike those that first animated the textile decentralizers. A kindred company which makes freight-car-sized products, and which has heretofore assumed that it must remain within spur track distance of a smelter, is now looking for a plant site in "a community of 20,000 to 30,000 population where people are still close to the soil and where a company can put down more roots than those that spring from weekly pay checks alone."

GENERAL ELECTRIC

General Electric, which is not only a big company but also one that makes both heavy capital goods and light consumer products, is making rational and methodical progress toward decentralization.

"General Electric," says a company official, "is equally determined to see that its bigness, of itself, makes extra contributions to its customers, stockholders, and employees . . . and to exhaust the possibilities of combining the strength and opportunity of the large institution with the social virtue and the intimacy of relationships possible in smaller organizations."

In keeping with this policy, GE, through decentralization both of plant structure and management functions, is aiming at six objectives which are themselves a revealing commentary on the potentialities of decentralization:

1. Avoidance of an undue percentage of employment in communities in which the company has manufacturing facilities.

2. Dispersal of employment into more areas from which the company receives customers and industrial business.

3. Simplification and clarification of the authority and responsibility of management.

4. Acquisition, development, and dissemination of information on broad company policies.

5. Development, through integration, of management ability at an early date.

6. Establishment of more intimate management-employee relations in the communities in which the company operates.

(For further discussion of G. E.'s thinking along those lines, see *Implication of Decentralization,* FACTORY, Nov., 1945, page 252.)

SYLVANIA

In pursuing these worthy objectives, GE (or any other company) could borrow leaves from few more experience-proved records of decentralization than those compiled by the Sylvania Electric Products Company, now based on six years and more of scattered but efficiently correlated feeder-plant operation. (See *Sylvania, a Case Study in Decentralization,* FACTORY, October, 1945.) Under the acid test conditions of war production, Sylvania proved to the impartial judgment of cost and output slide rules, and to the human satisfaction of workers and management, that 20 well-situated and separate plants can do what the two original plants with eight new hodge-podge "annexes" each could never have done—such as producing 100,000,000 wartime radio tubes in a whopping hurry. Now the company is busily pursuing the virtues of decentralization on a peacetime basis and liking the idea better all the time.

* * *

Movements, crusades, and fads have a way of getting out of hand and defeating their own purposes. The incipient decentralization movements going on in American industry could conceivably do the same. But there are numerous aspects of the phenomenon to date which suggest that it will not get out of hand, and that besides solving a lot of purely production and distribution problems, decentralization may help industry overcome many of its *social* problems.

Companies that have taken the lead are already demonstrating that decentralization can equal and usually improve on the standards of costs and efficiency established in older and larger parent plants. This pleases the management men whose main responsibility is getting out the goods. But no members of the management team are more keenly interested in decentralization than are the personnel men who must somehow keep workers in the plants from becoming robot victims of the machine age.

And looking right over their shoulders are the members of top management whose heads frequently ache with problems from all departments plus outside aches that come under the heading of public relations. From where they sit, decentralization looks at long last like a place to find some effective answers to really basic problems of American big-unit mass production, the greatest of which is bigness itself. Ever since the day the "old man" hired the one extra man whose first name he could no longer carry in his overburdened memory, industry has been plagued with the growing separation between management and labor. Perhaps we have now seen this separation at its widest gap.

The record of decentralization to date, as described in part above, does much to justify this hope. And the essence of the hope is that decentralization, if it has earned a pat definition, *is a means of combining efficiencies and economies of big business with human amenities and social virtues of little business.*

Decentralization formula worked out at Sylvania Electric Products Company is to pull parts and subassemblies out of the finishing plants and set them up in small "feeder" plants located in small towns. Here, wire products plant at Warren, Pa., which feeds parts to Sylvania's finishing plants at Salem and Danvers, Mass., and at St. Mary's, Pa., where lamps are assembled

SIX-POINT PROGRAM FOR WASTE CONTROL

W. J. COLLIER • PLANT ENGINEER, THOMPSON PRODUCTS, INC. CLEVELAND

All material must be checked by the departmental foreman before it is taken away as scrap by the transportation department

New salvage procedure at the Tapco plant of Thompson Products, Inc., resulted in a first-month net saving of $1500. In addition, machine parts, tools, and other salvageable items recovered during the first month—but not yet sorted, salvaged, or sold—are estimated to represent another $2000.

To achieve these savings, the former scrap department has been reorganized as a salvage department, and the following routine established:

1. Production foremen must approve "waste" before the daily collection from the bins.

2. Waste is collected from the bins by other than salvage department employees.

3. Salvage department separates genuine scrap from salvageable items.

4. All salvageable items become the actual property of the salvage department.

5. Salvaged items are returned to the primary production department at cost, or are "sold" to other departments. Material that cannot be salvaged is sold as scrap on the open market.

6. Profits from salvage operations are distributed by prorating them over all departments.

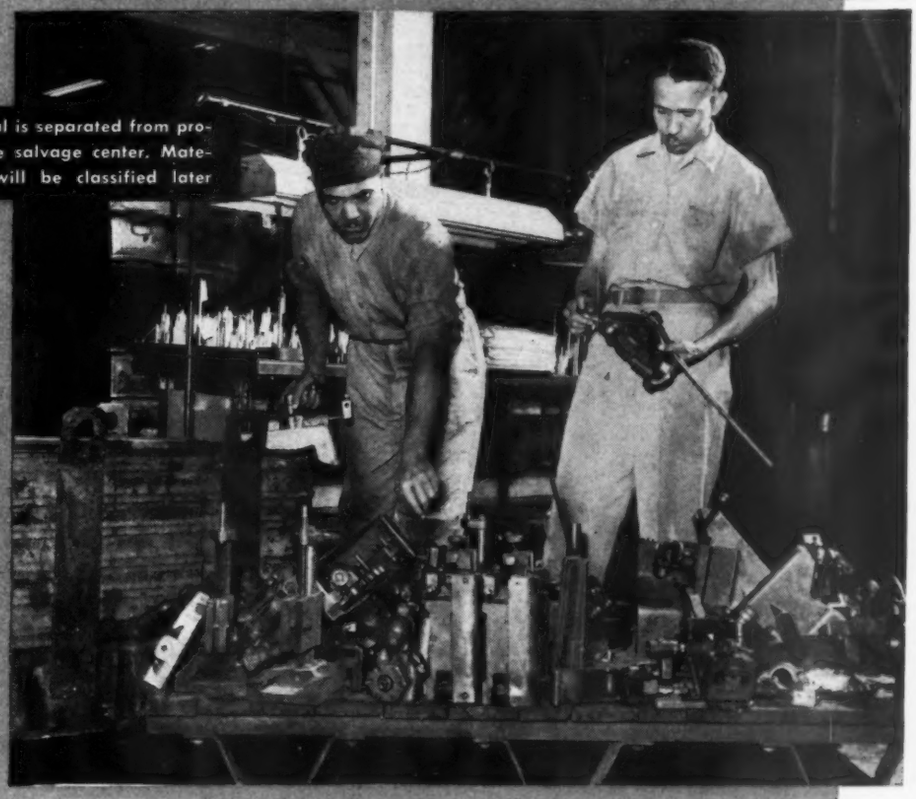
Need for the new program was pointed up by Thompson acquisition of the government-owned Tapco plant, together with much of its machinery and equipment. Inventory-taking revealed that thousands of valuable items—even conveyors—had found their way into the scrap heap. Analysis suggested one or both of these factors as the principal causes: (1) Employees had found it more convenient to deposit items in scrap bins than to return them to the proper departments or storerooms; or (2) through ignorance or poor judgment, employees or foremen had decided that the items were of no value.

First point of attack was the decision that no material other than production scrap could be placed in the scrap bins without the approval of the foreman. This, it was felt, would act as a deterrent to men who might normally throw a partially worn production tool into the bin rather than return it to the toolroom or have it repaired. This also places on the foreman the rightful responsibility of determining whether the tool is, in fact, worthless.

Secondary only to this *prevention* of waste is the part of the operation aimed at bringing a maximum dollar return from discarded material. Backbone of the program is the accounting procedure which records all scrap collected from any part of the plant as the actual property of the salvage department.

When any material is received in salvage which is in good condition and through ignorance, misjudgment, or mistake has found its way into the scrap bin, these items are returned to the department, their full replacement value being charged to the department and credited to salvage. When articles are received that can be put back into good condition economically, repairs are made and the items offered for "sale" to the department that turned them in. If this department no longer has a need for the items, they are offered for sale after repair, are charged to the department that purchases them, but at a depreciated figure, and this amount

Salvageable material is separated from production scrap at the salvage center. Material on the skid will be classified later



Salvage committee meets monthly to decide what to do with material that the sorters have been unable to classify

SALVAGED MATERIAL

July 10 to August 1

To: W. J. Collier cc: W. E. Close August 9, 1946
From: David MacLuckie L. B. Williams

DESCRIPTION	DPC OR TOOL NUMBER	QUANTITY	DISPOSITION	SALV. COST	NET VALUE
Forging die	HJ-1330-2	1	Proc. eng'g.	0	$ 250.00
3" snap gage	6209-3A	1	Acc. & parts	0	11.00
#6 snap gage	18703-3A	1	Acc. & parts	0	12.00
6" snap gage	None	1	Acc. & parts	0	12.00
13x20x8" centerless wheel	None	1	Valve div.	0	45.00
Flange and mounting for above wheel	None	1	Valve div.	0	72.00
14⅞x18⅞" sheets of cardboard	None	3866	Valve div.	$23.00	131.42
5x8" sheets of 20# kraft paper	None	627	Service div.	0	62.70
Coining die	H-1083-3	1	Valve div.	0	15.00
Extruding dies	D-539-19	58	Valve div.	$ 1.16	240.70
Extruding dies	CF-18-68	64	Valve div.	$ 1.28	208.00
Misc. Allen wrenches	None	41	Stockroom	0	10.00
Misc. open end wrenches	None	14	Stockroom	0	18.00
Litteli stock oiler	None	1	Acc. & parts	0	15.00
12x18" cast iron surface plate	None	1	Toolroom	0	50.00
TOTAL				$25.44	$1152.82

That the salvage department pays its way at the Thompson's Tapco plant is obvious from the above report. Savings of more than $1100 in less than a month are indicated

less cost of repairs is credited to salvage.

At the end of each month, any "profit" shown by the salvage department is distributed among the operating departments by being prorated on a direct-labor basis. In this manner, each department receives a fair share, and those departments that have exercised care and have not discarded valuable items benefit from the operations of the lax departments.

Because of the "penalty" provisions in the accounting procedure, it was felt necessary to take certain precautions for the protection of both the salvage and the operating departments. For this reason, the transportation department, and not salvage, is responsible for the collection of scrap from the bins. Thus employees of the salvage department are not required to enter operational areas, and there is no possibility of charges that salvage men have "picked up" valuable parts while going through the department. Because salvage makes a profit on the resale of parts back to the production departments, this might not always have been an easy charge to answer.

Seven sorters take charge of the material delivered by transportation. The first separation is into two classes—scrap, to be sold outright, and potentially salvageable material. Some of the items in the latter group may later be sold as scrap, but this decision is made by supervisors, not sorters.

The sorters deposit the salvageable material in a separate room, where they segregate it roughly by type—tools, equipment, fixtures, non-machined scrap, and so forth. The salvage foreman makes a daily check on this material. Items he thinks have been disposed of by mistake he immediately returns to the department, with a bill for the full cost. All parts he knows to be salvageable are sent to the machine shop or maintenance department to be put in working order.

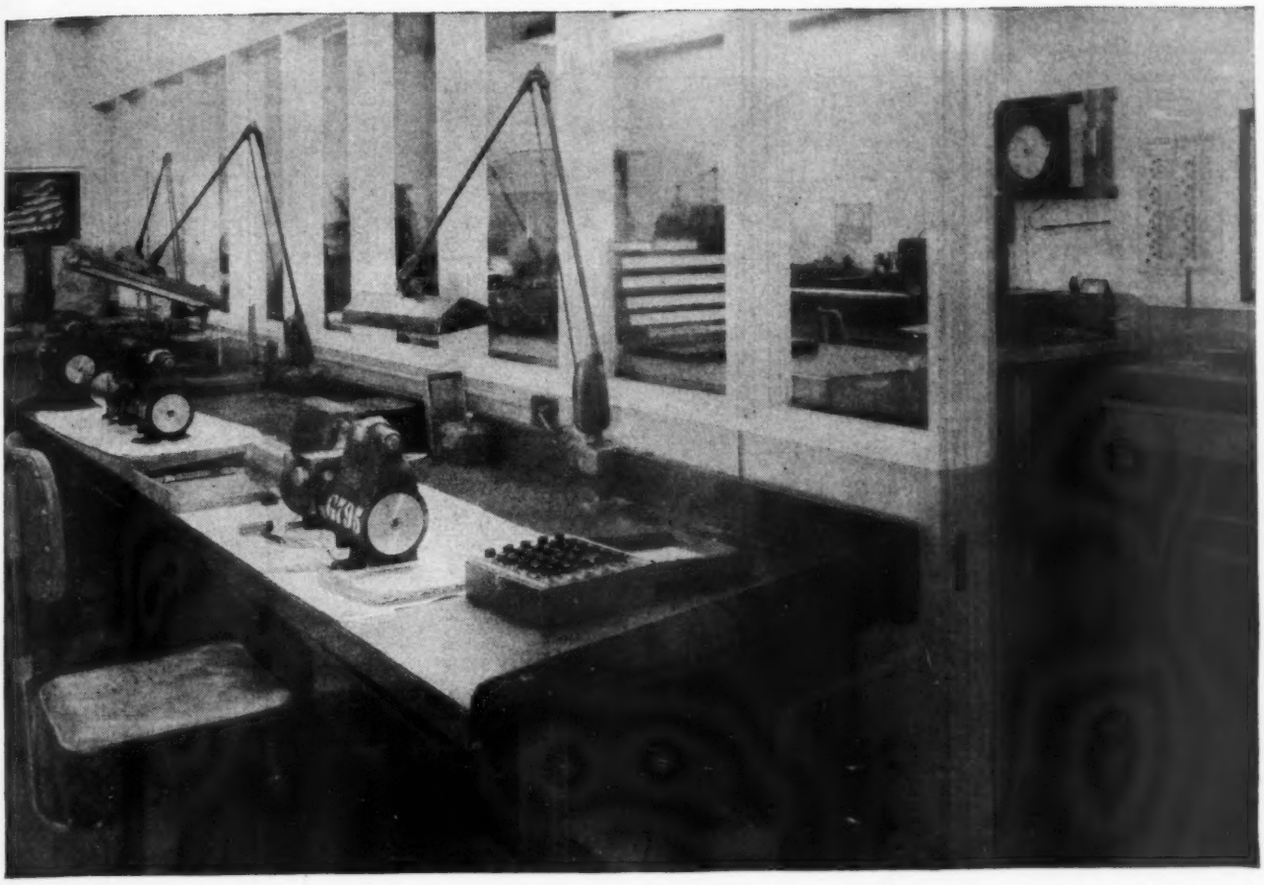
UNCLASSIFIED ITEMS

Items that the salvage supervisor is unable to classify are set aside for the monthly meeting of the salvage committee. A thorough examination of each questionable item is made by the committee—the supervisor of mechanical maintenance examines such items as piping and electrical equipment which might be used in maintenance of the building; the supervisor of machine repair examines gears, sheaves, and bearings; and the plant engineer checks all items not taken by these departments to make sure that they cannot be used by any other division of the company.

To the material previously classed as scrap is added any item this committee has found to have no salvage value. At the end of the month all this material is sorted by grade and class of material, and is sold as scrap.

Since the salvage department normally employs seven sorters whose duty it is to sort scrap by class and grade, the setting aside of valuable items found in the scrap bins entails no extra duties. The only additional expenses of operating this new salvage function are the cost of paperwork involved in the reworking of items, the rework itself, the operation of a degreaser, the purchase of tools for disassembling fixtures, and the small amount of time required of the supervisor and the committee in determining the disposition of the items.

Even in the relatively short time that the new procedure has been in operation, the savings have been considerable. However, Thompson feels that all will not have been lost even if the department ceases to find valuable discarded items in the bins, and therefore fails to show a paper profit. The effect on the production divisions—making them more careful of their tooling—and the intangible savings that will result because time will not have to be wasted searching for lost tools, will more than justify the small additional expense.



To insure uniform conditions for close inspection and measurement of gages, the gage checking room at Adel Precision Products Corporation is air conditioned. Temperature is held at 68-deg. F., and relative humidity is never allowed to vary more than a point or two

CARE AND HANDLING OF GAGES IN QUALITY CONTROL

LELAND S. SHICKLE • CHIEF INSPECTOR, ADEL PRECISION PRODUCTS CORPORATION BURBANK, CALIF.

Scrapped parts less than 3 percent; those requiring rework held to around 14 percent. Much of this accomplishment is attributed to close control of gages

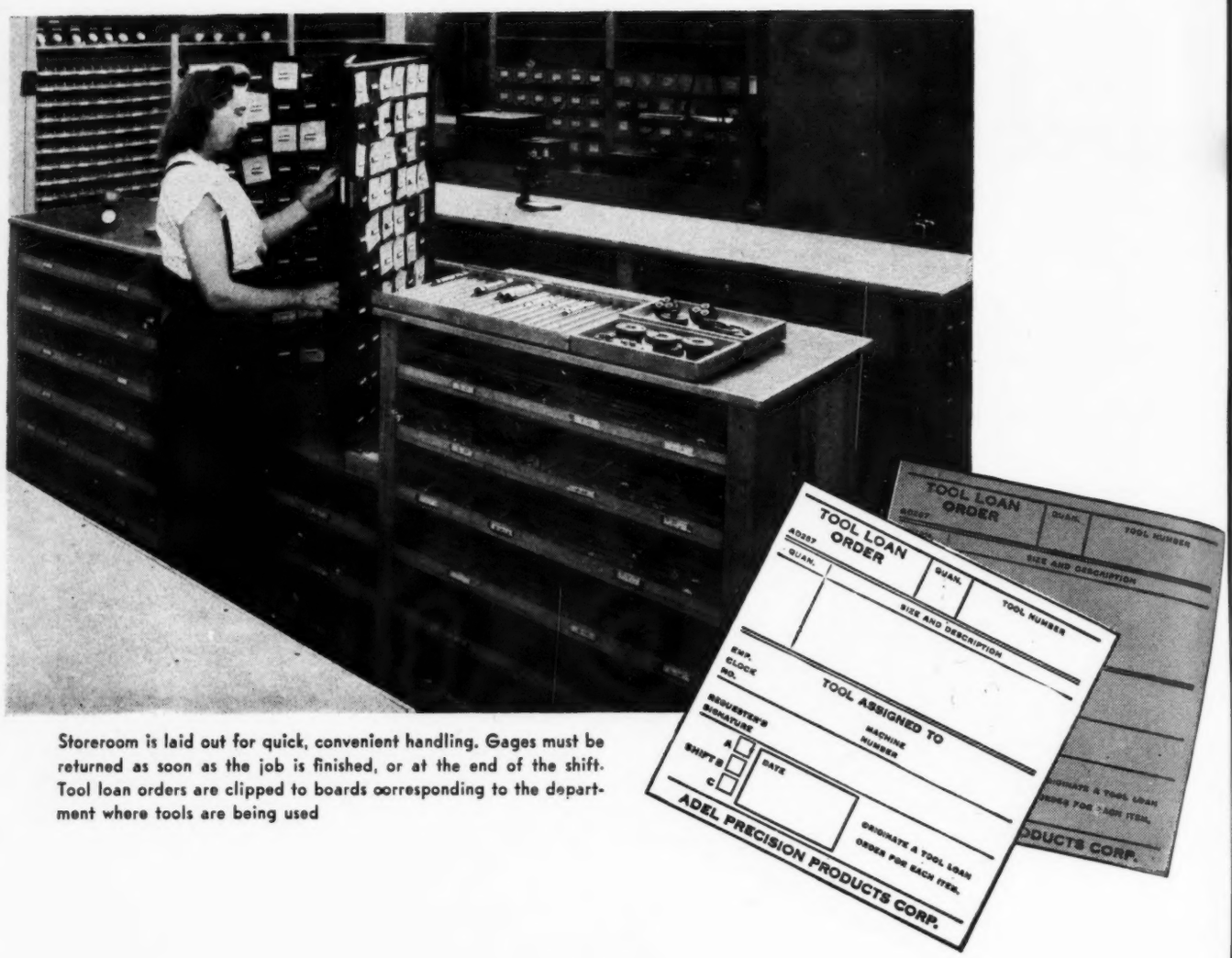
Statistical quality control methods are reinforced at Adel by exact, systematic control over the gages used to check the parts in progress.

More than 2800 gages alone are in active use. They are controlled by a simple but rigorous system which guarantees, insofar as it is possible for any system to do, the integrity of every gage issued.

A gage is never used for more than one shift by either a machine operator or an inspector. This rule applies especially to plug thread gages which are used extensively.

At the beginning of a shift, or when a new job is started, standard gages and special inspection tools are issued for the operations to be performed as specified by the route sheet (manufacturing instructions) for each production release.

A tool loan order in duplicate,



Storeroom is laid out for quick, convenient handling. Gages must be returned as soon as the job is finished, or at the end of the shift. Tool loan orders are clipped to boards corresponding to the department where tools are being used

made out by production personnel or inspectors, is authority for issuing such gages. The white copy of the tool loan order is retained until the gage is returned either at the completion of a job or at the end of the shift. The gage clerk at once compares the notations on the yellow duplicate to make sure they correspond to those on the white slip, which describes the gages they accompany. The original white tool loan order copy is kept on file for a few days in case damage to the tool is discovered later, whereupon it is traced back to the user. The yellow slip is discarded after checking it with the returned inspection tool. Returned gages are segregated and placed in trays, partitioned for their protection.

The efficient issuing and receiving of gages during the rush periods, at the beginning and ending of the work shift, is done by not more than three attendants. One clerk adequately handles requests for gages during the interim, besides putting away the inspection tools that have been checked. The other two attendants are normally occupied with gage and first article inspection. Only the three persons mentioned are required to issue, receive, check, and otherwise handle hundreds of precision gages daily with minimum loss of time for production people.

CONTROLLED CONDITIONS

Trays loaded with used gages are sent to the gage inspection room, which is air conditioned, through one of two air-locked compartments joining it with the gage storeroom. Gages are checked under carefully controlled temperature and humidity, both held constant within narrow limits, thus assuring a uniform comparison.

Used gages are first cleaned and then microscopically examined for nicks, scratches, or the slightest damage of any kind. Gage inspectors also watch for slivers of metal, particularly aluminum, adhering to thread gages, which tend to "build up" on the threads. Any damage found is traced back to the user through the tool loan order on file, and the gage is discarded.

Gages are rapidly checked by means of prepared data pertaining to individual gages and for those of a particular size. From the time a gage is first received from the manfacturer, a case history is kept throughout its life. All information required for routine checking is entered in a notebook for ready reference by gage inspectors, thereby eliminating time-consuming calcu-

PLANNED BY		MAT. 100 PARTS	MATERIAL	ADEL PRECISION PRODUCTS CORP.	PRINT - CHANGE LETTER	PAGE OF
SARGE		100	Alum Alloy Casting	**ROUTE SHEET**	10024 "E"	1 3
APPROVED BY	WRITTEN BY				E. O. NUMBER	ECON. LOT SIZE
SARGE				PART NAME	DATE RELEASED	SUPERSEDES
			CODE	HAND PUMP BODY	7-11-45	

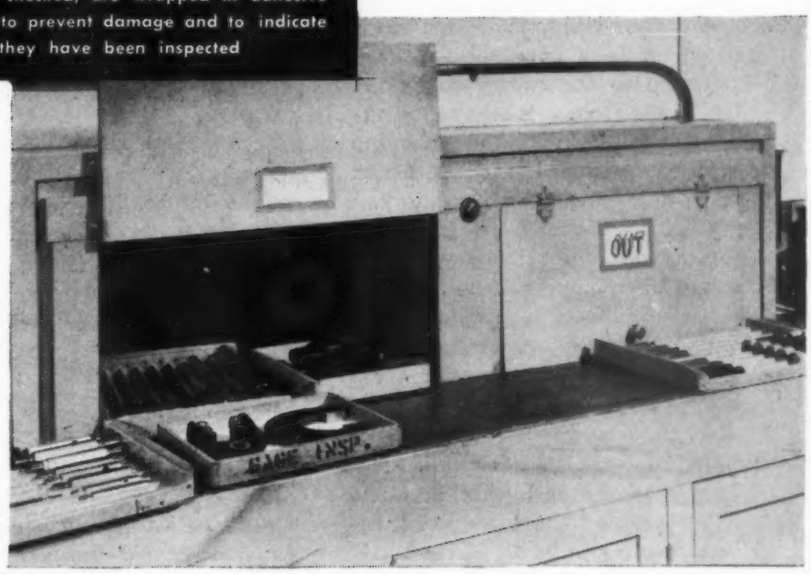
OPP'N CODE	SET-UP HRS. PER 100 PCS.	LEAD TIME	OPERATION DESCRIPTION	GAGES	SPEC. TOOLS	STD. TOOLS	DO NOT USE
			SAND BLAST CASTING SMOOTH				
1-10 150			Hold in fixture	Plug gages:	Chuck jaws		
			Rough bore 1.126-1.129 hole in 2 cuts	1.122-1.124	T-3918		
			Finish bore to 1.122-1.124	1.437-1.443	Boring bars		
			Face bottom of bore and recess 3/16" wide X 1.179 diameter	1.365-1.370 Depth gage	T-7136 & T-13328 Recess tool		
			Co-bore the following: Thread diameter to size-1.375 tol.355	T-11550 Depth gage	T-11850 Tool bits		
			Chamfer 1 3/16" diameter X 60° Chamfer 1½" diameter X 90°	T-11539 Checking Fix-	T-10690 & T-13329 Co-bore		
			Recess for thread relief & form .031 radius	ture T-12661 1⅛"-18 Plug	T-7138		
			Bore 1.355 diameter to 1.365-1.370 Single point threads	thread gage Recess gage	Recess tool		
			Break sharp edges	T-13298	T-4237		
2-20 410			Straddle mill 4 bosses and 2 ears	Universal Snap Gage 1.718-1.723	Fixture T-3168	Side mill Cutters	
				Gage T-11797 Gage T-11796			
3-30 530			Drill 2 "F" diameter mounting holes half way from each side	Progressive plug gage	Drill jig T-7425	"F" Drill "N" Drill	
			Drill 2 "N" diameter holes	T-12571	Checking fix-	5/16" Reamer	
			Ream to .3125 diameter	Plug gages:	ture T-11554	17.3 M/M Drill	
			Drill .681-.685 and flat bottom drill	.312-.313		17.3 M/M Flat	
			Drill 19/64" Diameter thru-front boss	.681-.685		bottom drill	
			Core drill 21/32" diameter	.687-.691		19/64" Drill	
			Ream .687-.691 diameter	Check bars-		21/32" Core drill	
				T-12537 & T-12537-1		11/16" Reamer	

Standard gages and special inspection tools for operations to be performed, are specified by a "route sheet." A tool loan order (see facing page), made out in duplicate by production personnel or inspectors, constitutes the authority for issuing the gages

lations. Such records include the wire sizes to use in measuring threads and the initial "go" and "not go" diameter tolerances. Also noted is the critical diameter of the gages, limiting the extent to which they may wear before being discarded. This basic reference information has proved to be of great value in deriving maximum use of gages without allowing them to wear beyond the danger point.

New plug thread gages are initially checked by optical comparator for thread form, lead, and minor diameter. The data are recorded, and, thereafter, the gages routine-checked for major pitch diameter by measuring over wires by super-micrometer. Cylindrical plug gages are likewise checked by super-micrometer after each use period. Roller thread and ring thread gages are checked against standard thread

Temperature variations are prevented by air locks between the gage checking room and gage storeroom. Gages in tray have been checked, are wrapped in adhesive tape to prevent damage and to indicate that they have been inspected



plug gages. Diameter snap gages are checked by standard gage blocks, accurate to within four-millionths (0.000004) of an inch. Incidentally, cylindrical plug gages are ground down from discarded thread plug gages.

After a gage has been checked, and the measurements have been entered on a gage room daily inspection form, its working portion is wrapped in adhesive tape ready to be returned to its place in the gage storage room. The simple expedient of taping serves the double purpose of protecting the gage from damage and indicating that it has been inspected and approved for further use. A gage once having crossed the counter and subsequently been returned with the tape intact is, nevertheless, reinspected before it can be reissued. Inspected gages are replaced in their trays and passed out to the storeroom through the second air-locked compartment.

After each day's operation, information previously entered on the gage room daily inspection record form is copied onto a gage history record card for a permanent record.

CURRENT STATUS KNOWN

The use record thus kept is a simple, direct, easily understood means for plotting the gradual wear of the gage, and serves to indicate the approach to the easily detected minimum dimension which, when reached, will end its usefulness. Gages are coded and numbered serially so that complete and accurate record is kept of their current status.

A gage delinquency report is made out daily, noting all gages not returned to the storeroom by the end of the shift. It is sent to the supervisor of the section in which the gage was issued. Immediate action in tracing the gage is mandatory.

During a recent 6-month period, the inspection department, consisting of 18 employees, including gage stores attendants, layout inspectors, and gage inspectors, accounted for well over a million inspection operations on parts manufactured in Adel shops and received from vendors. Of those parts manufactured here, scrapped parts were less than 3 percent and those requiring rework were around 14 percent.

INSPECTORS DAILY REPORT

Inspector: John Smith — Date: 11-7-46

DESCRIPTION	SIZE & CLASS	SERIAL NUMBER	M.O.W. GO	M.O.W. NOT GO
THREAD GAGE	5/16-32 C3	S-5	.31946	.32130

AS GAGES ARE CHECKED, THEIR MEASUREMENTS ARE ENTERED ON AN INSPECTOR'S REPORT

GAGE HISTORY RECORD

DESCRIPTION 5/16-32 NEF-3 — SERIAL No. S-5

GO MAX.	GO MIN.	M. O. W.	NOT GO MAX.	NOT GO MIN.
.31953	.31938		.32137	.32123

INSP.	DATE	GO	NOT GO	INSP.	DATE	GO	NOT GO	INSP.	DATE	GO	NOT GO
J. Jones	3-4-6	.31947	.32137								
W. B.	3-17-6	.31944	.32134								
J. T.	4-10-6	.31940	.32134								
J. J.	5-12-6	Changed .31952	.32132								
J. J.	6-7-6	.3194"	32130								

INFORMATION ON INSPECTORS' REPORTS IS TRANSFERRED TO GAGE HISTORY RECORD CARDS

DELINQUENT REPORT

To: Inspection and Production
From: Gage Inspection

The following employees have failed to return the gages specified below.

Date	Employee	Department & Clock No.	Shift	Gage Description

In order to meet the required demand, the return or clearance through the Gage Inspection Crib is necessary.

Your assistance in making it possible will be appreciated.

Gage Inspection Foreman

cc:

If gages are not returned at shift's end, a delinquency report goes to the supervisor of the section to which gage was issued. Immediate action in tracing the tool is mandatory

	DAYWORK PLANTS	PIECEWORK PLANTS	PLANTS WITH STANDARDS SYSTEM
WAGE SCALE	Usually low	Fairly high. Approximately 15 percent higher than daywork	Highest. Approximately 15 percent higher than piecework
COST OF OPERATIONS	High and hard to determine	Moderate, easily determined. Piecework when set must include the inherent lost time of a job as well as irregularities. Therefore, they include, hide, and pay for the productive leaks	Low and easily determined. A "unit value" includes only the measure of the net job. The operator is protected by being paid 1 unit for each minute lost by the leaks (crane delays, etc.). The expense of these allowances is chargeable to the department. Hence, they are revealed and eliminated, leaving the company paying for only net production
COOPERATION AND MORALE BETWEEN SUPERVISION AND OPERATORS	Dependent entirely upon supervision	Very little, no tie between the two. Dependent upon supervision	High, because each is dependent upon the other for premium wages. The worker must have the assistance of the foreman through encouragement, training, service, etc., and the foreman is dependent upon the operator's reaction to this service. Furthermore, each operator realizes that he is important enough to be a measured man rather than a clock number, and he is rewarded in proportion to his effectiveness both in regard to premiums and to advancement
PRODUCTIVITY	30 to 40 unit-hour. (Based on departments studied and later set up on standards system)	40 to 55 unit-hour. (Based on departments studied and changed to standards system)	75 to 85 unit-hour. (Proved by performance of some 300,000 workers on standards system)

TABLE IN COMPANY PUBLICATION DEMONSTRATES SUPERIORITY OF STANDARDS SYSTEM OF WAGE PAYMENT

SELLING THE INCENTIVE PLAN TO WORKERS

With standards systems and incentive pay under general attack by organized labor, industry must presell employees on its wage payment plan *and keep them sold.* Here's one of the ways in which the Lynchburg (Va.) Foundry Company has helped to maintain the popularity of its wage incentive system during the 16 years it has been in operation.

PLANT PAPER USED

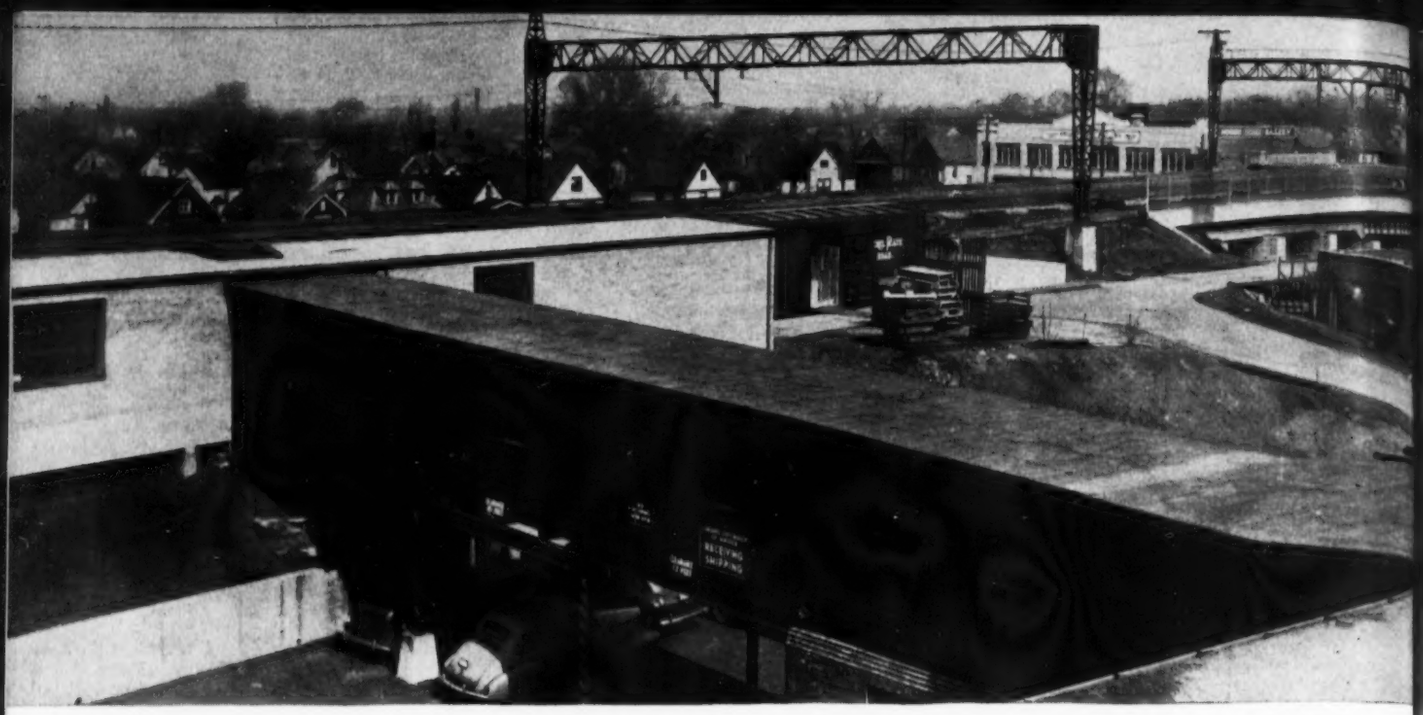
The pages of the company publication, "The Ironworker," are occasionally used to remind employees of the advantages of the incentive system. One recent article included the table reproduced above. The following text is from the article, which was signed by the supervisor of the standards and payroll department:

"You and I are wondering what we can do that might have a good effect upon post-war conditions. One thing certainly we can do is to train ourselves to meet the stricter competition that will undoubtedly come . . .

"To illustrate the advantages of the standards system over other methods of wage payment, the accompanying analysis has been compiled. Actual figures assembled from 300 plants employing some 300,000 workers furnished the basis for the findings . . .

"The availability to the worker of pay in proportion to his efficiency has increased his pay and production, and has decreased the unit cost of the product, effecting material financial benefit to the worker, industry, and the consumer. This is a definite check on inflation and promotes a higher standard of living, which is the goal that made America.

"The practical mind agrees with the theorist that the promotion of such plans can do much to avoid lower wages, slack work, and depressed economy, which will surely come if we don't prepare now."



No more cold or wet working conditions on this heated brick-and-concrete railroad freight platform and the insulated bridge which extends from the second floor of the plant. Overhead-opening doors on the platform are spaced to match freight car openings

MODERNIZED SHIPPING DOCKS, REDUCED UNIT HANDLING COST

WILLIAM HASSELO • PLANT ENGINEER, CONTAINER CORPORATION OF AMERICA CLEVELAND

Modernization of its shipping and receiving facilities is getting more than the desired results for the Container Corporation of America at its Cleveland plant. Aimed to handle double the requirements of the original layout, it also has reduced unit handling costs by 15 percent.

Basis for this achievement was the provision of modern yet simple conveniences to remove the traditional exposure to bad weather of men and materials located on outside platforms. Equally simple building improvements have helped to step up over-all worker efficiency and create employee satisfaction.

Shipments are made and received at this plant by rail and truck. The railroad siding is about 100 feet distant from the plant, at second floor level. Hence shipping operations are divided between two floors, trucks being handled from a platform alongside the building on the first floor, and railway freight via a bridge extending over the truck yard from the second floor to the rail platform.

Before improvements, it used to be pretty cold in the winter months working on the old shed-type freight and truck docks. Rainy weather was just as unpleasant for the men. And when the incoming heavy paper stock got wet, as it frequently did, it had to be laid aside for several days to dry. Furthermore, although the old connecting bridge was fully enclosed, it funneled cold drafts right into the plant through side-opening doors which remained open whenever the lift trucks were busy shuttling loads from shipping platform to plant.

These are the improvements installed by Container Corporation which made the workers' lot so much easier and pleasanter:

1. Railroad platform. A new weatherproof freight platform 150 feet long was built on a reinforced concrete foundation, with brick sidewalls and an insulated roof. Its four loading door openings were made the same size as the freight car door openings, and were provided with overhead spring-balanced doors which open up out of the way of possible damage from lift trucks. Easy to raise and lower, too, even on a crowded platform. The spacing of these doors was made to correspond exactly to door openings of freight cars alongside. A smooth concrete floor eased movement of lift trucks.

2. Canvas couplings. To shut out completely all bad weather effects, measured strips of tarpaulin were made with hooks and eyes to couple the platform opening with each freight car opening at both sides and the top. The dockboard effectually closes the bottom.

3. Unit heaters. In cold weather, temperature of railroad platform is kept in working comfort zone by three thermostatically controlled unit heaters located at the ends and near the middle of the platform.

4. Extension lights. There is no more fumbling around inside dark freight cars, because each loading door is equipped with a safe extension light and heavy-duty, rubber-covered cable long enough to hook in the extremities of a freight car. Cable rolls up into a spring-wound reel fixture on the ceiling when not in use. The platform itself, of course, is adequately lighted.

5. Insulated bridge. The bridge from railroad platform to second floor of plant was reconstructed to make it thoroughly weatherproof. Roof and wood siding walls were insulated. Timber floor, running at a slight grade to platform, was covered with steel plates for long wear and smooth riding. Good overhead lighting allows quicker truck movements with safety.

Every Month . . .

AMONG THE ADVERTISING PAGES, these valuable aids to low-cost productions: the plant operation man's guide to **WHAT'S NEW IN EQUIPMENT** (page 172) . . . a summary of **LABOR DEVELOPMENTS** (page 244) . . . things **YOU WANT TO KNOW** more about (page 234)

6. Bridge entrance. Where the bridge joins the building, the old hinged swinging doors were replaced by a large motor-operated overhead door. Controls for opening and shutting this door are actuated by pairs of chain pulls suspended from the ceiling at points in the passageway 20 feet either side of door so that lift truck operators can reach them without dismounting. As a result, doors are never left open to invite cold drafts. Another pair of door controls hangs just outside the elevator door adjacent to the bridge entrance.

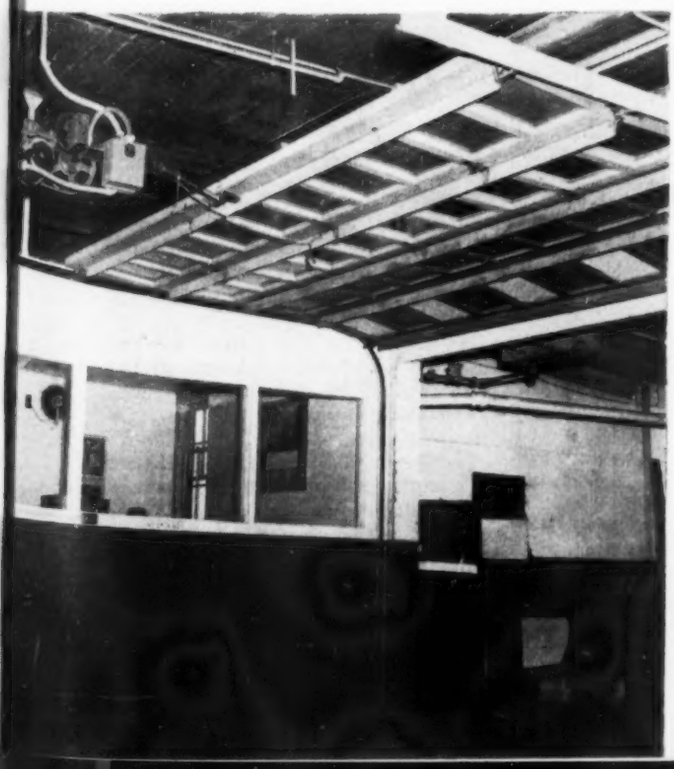
On the bridge side of the door, two unit heaters mounted near the ceiling minimize the tendency of cold drafts to penetrate into the factory floor when the door is open.

7. Dispatching office. A fully enclosed dispatching office has been built just inside the bridge entrance. By means of a two-way public address system having outlets on the railway platform, instructions can be given from this office to workmen on the platform 100 to 150 feet away.

The truck dock facilities on the first floor have been somewhat similarly revamped, particularly in those features to reduce the effects of bad weather. Finally, by segregation of the storage of incoming raw materials from outgoing finished products, which was not done formerly, and by installation of an elevator in the center of the factory building to transport raw stock to the production floor, a smoother flow of materials movement has been obtained.

None of these improvements individually can be called by any stretch of the imagination an innovation. But in combination they all have added up to prove once again that better working conditions pay off in lower unit costs, no matter where they may be instituted.

The dispatching office just inside the bridge entrance is equipped with a two-way public address system to shipping platforms



Chain pulls for opening and closing door between bridge and factory are placed so truck operators can reach them without dismounting

operating shorts

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

Special hitch and hook for carrying copper from storage to shops allow four reels to be moved at once at Allis-Chalmers. Work time has been cut 75 percent

KEARNEY & TRECKER
CORPORATION
A TOOL
IS BUT THE EXTENSION OF A MAN'S HAND
MACHINE TOOLS
INCREASE A MAN'S POWER TO PRODUCE
AND ASSURE A HIGHER STANDARD OF LIVING

With more and more industrial concerns finding that it pays to give workers "the economic facts of life," a well-known machine tool manufacturer takes the next step and passes them on to the general public. Billboard is located on a building wall that faces a widely traveled country thoroughfare. Message is changed at six-month intervals

SPECIAL CRANE HOOK

RALPH MICHAELS, Manufacturing Department, Allis-Chalmers Manufacturing Company, Milwaukee 1

Regular crane hooks were formerly used to carry copper reels from the storage bins to the shops. This practice was not safe, as these hooks are not shaped to hold the reels in a tight grip. Also, the crane man and the ground man needed an entire day to transport the 400 reels needed daily.

Now the use of a special cable hitch and hook, shaped to fit the reels, assures safety in handling, and four reels are transported at once, cutting work time 75 percent.

SAND TRAPS REDUCE DUCT-CLEANING TIME

B. A. PARKS, Maintenance Engineer, Crane Company, Chicago

Dust collecting systems, especially systems handling foundry dust and similar materials, require frequent cleaning. The heavier particles have a tendency to collect at the bottom in the long horizontal runs of the exhaust duct. Sometimes the accumulation becomes so great that it almost blocks the duct—which means a laborious job of cleaning it out.

As an illustration of the magnitude of this cleaning job, where there are many long horizontal runs of exhaust duct, we cite our former experience in one of our foundries. In times past it required the labor of 12 to 15 men all day Sunday every two weeks to clean out the accumulation of sand in the long horizontal ducts. This was a mean job, and an expensive one, until one of the men came up with an idea to install sand traps ahead of each long horizontal run.

Since installing these traps we seldom have to clean out the duct system, and the sand collected in the traps is drawn off into lift truck boxes at any convenient time, and then trucked to the dump.

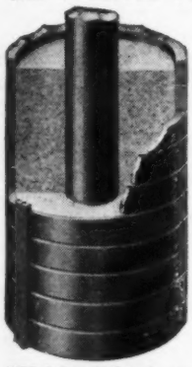
As will be noted from the sketch, these sand traps are essentially a box in which the air velocity is suddenly reduced, permitting the heavier particles to drop by gravity into the hopper at the bottom. The satisfactory performance of the trap is, of course, dependent upon building it ample in size in order to obtain a large reduction in velocity of the air, and also to provide at least a 90-deg. turn in the direction of flow, so that the separation

Exide

IRONCLAD BATTERIES

BUILT FOR PEAK PERFORMANCE AND LONG LIFE IN HEAVY-DUTY SERVICE...

The Exide-Ironclad is a different type of battery . . . in design, construction, service qualities. It was developed to meet the need for a battery to deliver high, sustained power in heavy-duty service over a long period of time.



THE POSITIVE PLATE is unique in battery design. It consists of a series of slotted, vertical, hollow tubes which contain the active material (See illustration at left). The slots in the tubes are so fine that, while they permit easy access to the electrolyte, they prevent the lead oxide from readily washing out, thus adding considerably to the life of the plate.

THE NEGATIVE PLATE has been designed and is built to equal the increased life of the positive plate. Like the positive plate, it has two feet at the bottom to raise it above the two supporting ribs.

SEPARATORS are made of Exide Mipor, a special rubber composition, and will match the long life of Exide-Ironclad plates. The cutaway illustration shows how separators rest on ribs well below bottom of plates, thus making probability of internal short circuits very remote.

THE EXIDE-IRONCLAD ASSEMBLY is sealed in jars of Giant Compound. Jars are practically unbreakable in normal service.

THE RESULT is an efficient, ruggedly built battery that assures dependable performance, long life and maximum economy . . . a battery that fully measures up to each service requirement . . .

★ ***HIGH POWER ABILITY*** . . . needed in frequent "stop and go" service.

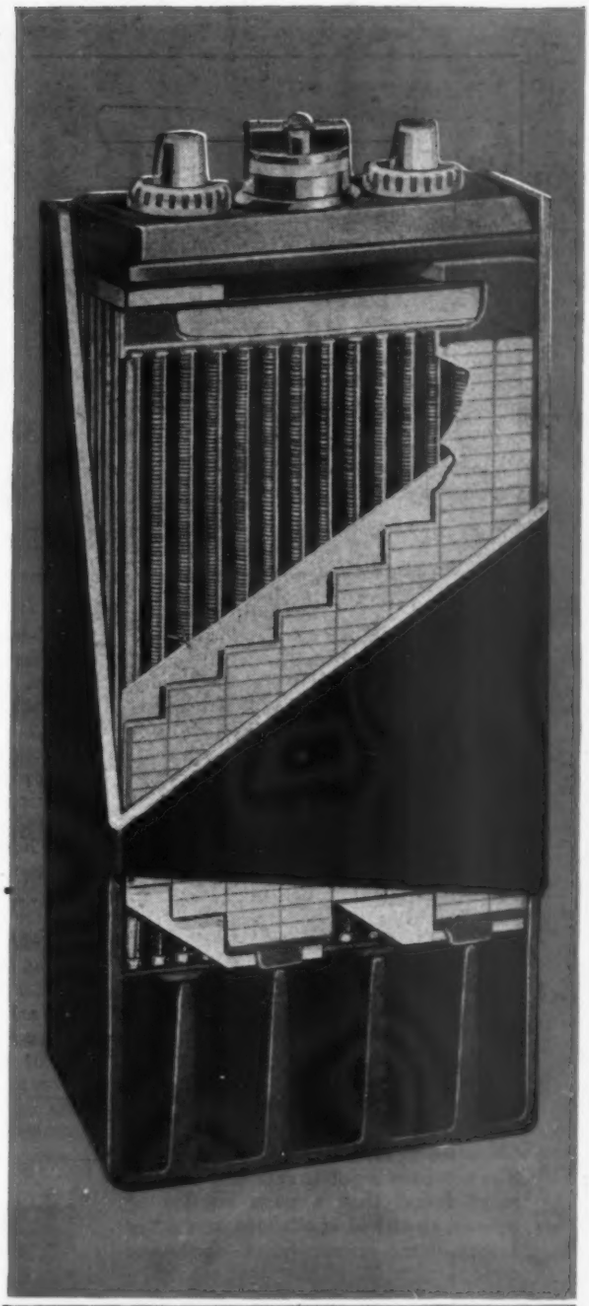
★ ***HIGH MAINTAINED VOLTAGE*** throughout discharge.

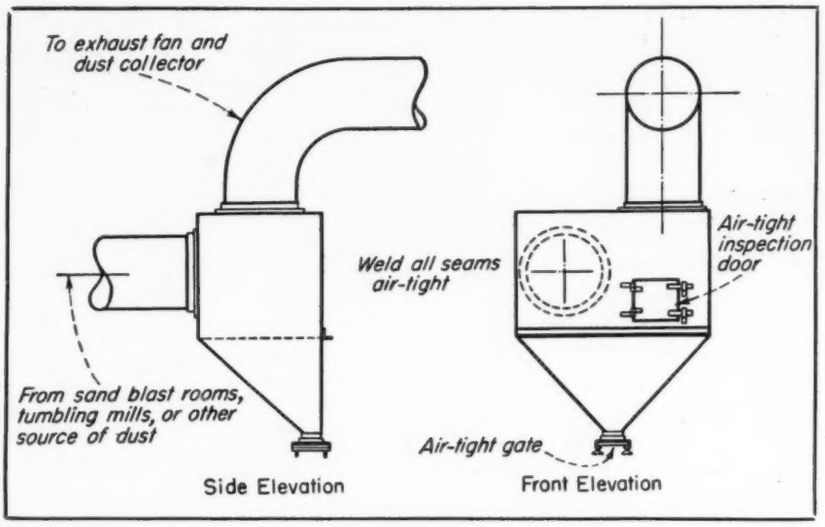
★ ***HIGH ELECTRICAL EFFICIENCY*** that keeps operating costs low.

★ ***RUGGED CONSTRUCTION*** . . . for long life.

Exide-Ironclads are supplied in sizes to suit every make and type of electric industrial truck.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto




To exhaust fan and dust collector
Weld all seams air-tight
Air-tight inspection door
From sand blast rooms, tumbling mills, or other source of dust
Air-tight gate
Side Elevation
Front Elevation

of the sand will be aided by the change in direction.

It might be assumed that these sand traps would cause a noticeable reduction in static suction at the point of dust removal, but this is more than compensated for by the fact that the efficiency of the dust collecting system is maintained. As a matter of fact the resistance through the sand trap could be reduced somewhat by providing a conical connection between the trap and the outlet duct so as to reduce the inlet loss to the duct.

NYLON SALE CURES MONDAY ABSENTEEISM

Monday's record absenteeism has been turned into a nearly 100 percent attendance at an Eastern candy factory. The company's public relations department found that a noon auction of nylons, electrical appliances, and other scarce items helped boost employees over the hurdle of that Monday stay-at-home feeling. Now the week's production gets off to a good start because the working force is at full strength. Also, employee morale is so pepped up that employment turnover, normally high on Monday, has been reduced.

FOLDING LUNCH TABLE SEATS ENCOURAGE CLEANLINESS

D. D. DOUGLAS, Plant Engineer, Chevrolet Gear & Axle Division, General Motors Corporation, Detroit

Lunch table seats which fold up under tables when not in use are found to have many advantages. By keeping the floor area clear, the task of cleaning up after the lunch hour is made much simpler. Table crowding is eliminated and, by having the seats stationary, safety hazards are also reduced.

Constructed of steel supports with hard-surface tops and hardwood seats, the lunch table can easily be kept clean, and presents an attractive appearance. Standard sections of 2-, 1½-, and 1¼-in. pipe are used in the construction. Sections of pipe are cut to the proper length and welded together, forming a table that is solid and rugged. When assembled these sections form the horizontal and vertical supports for both the table surface and the individual seats. Ordinary pipe caps are screwed on to the bottom of the seat support which rests on the floor.

The seats are prevented from tipping too far forward or back by a slot and peg arrangement. A slot which runs in line with the circumference of the pipe is cut in the horizontal table and seat support, and a steel peg is inserted in the vertical seat leg. When these two sections are welded together, the degree of rotation of the seat is limited. Wooden, circular seats, mounted on steel supporting disks, are found to be both practical and comfortable.

WORN-OUT BALL BEARINGS USED TO SAVE MANPOWER

HARRY G. WESSEL, Foreman, Die and Mold Department, Westinghouse Airbrake Company, Wilmerding, Pa.

Worn-out ball bearings, especially the larger ones, can be made to serve a further useful purpose if they are taken to the tool-making department, and the hardened steel balls are removed from the races. These steel balls, usually consigned to the scrap pile, have been the means of making some really hard jobs comparatively light, in one plant.

In the rubber molding department, for instance, the production of one large packing cup requires the use of 24 molds, each weighing about 160 pounds. The design of the cup is such that the molds cannot be permanently mounted in the presses, but must be pulled out on a bench to permit removal of the molded part.

The curing cycle for the rubber makes it necessary for each operator to slide two of these molds from the press to the bench, remove the molded parts, reload the two molds, and return them to the press every 5 minutes. Near the end of an 8-hour shift, the operator fatigue on this job was clearly evident, especially during the summer.

Discarded steel balls, mounted in the base of the mold, made it possible to slide the molds in and out of the press with little manual effort, and their use

Seats that push away under the factory lunch table leave the floor area clear so that sweeping up after the lunch hour is made easy. Made of standard sections of pipe, they provide substantial seats which eliminate crowding and reduce safety hazards

FOR EVERY APPLICATION

– every load

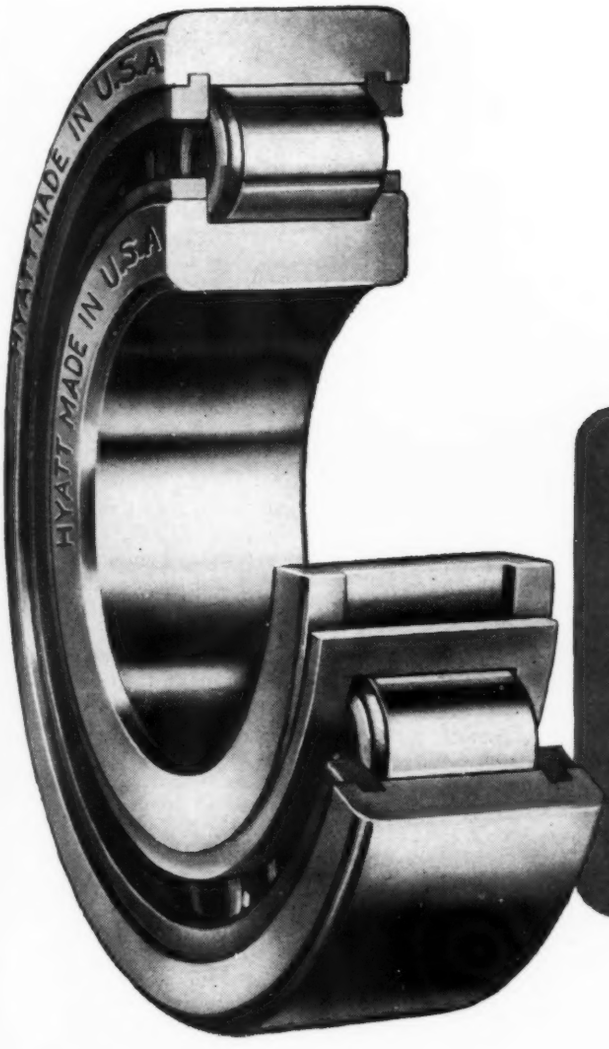
– every speed

– every position

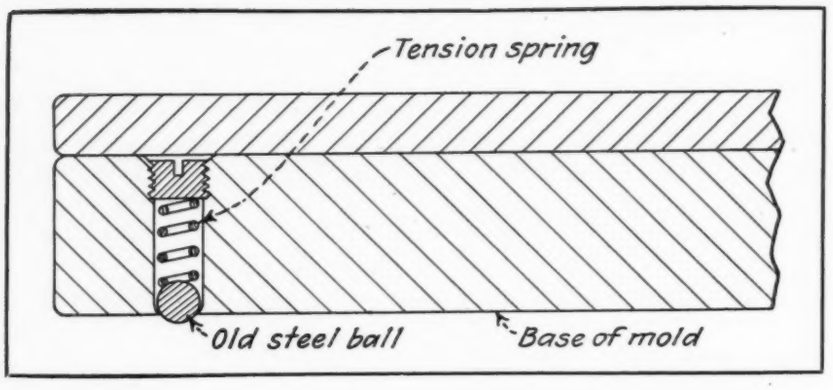
All kinds of mechanical equipment, automotive, industrial, agricultural have one thing in common — bearings by Hyatt.

And there are thousands of other examples where machine design engineers and ultimate users alike are in accord — approving Hyatt Roller Bearings.

The large number of types of Hyatts available means there is a Hyatt Roller Bearing for every application. Consult us on your bearing problems. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



HYATT
ROLLER BEARINGS



increased operators' morale considerably. The sketch shows a partial section of the mold through one hole in which the ball has been installed. As many balls may be used as are necessary to hold the face of the mold clear of the machine table, with the spring tension adjusted to suit the weight.

The same method has been applied to heavy press dies and miscellaneous jigs and fixtures to facilitate placing them in position on machine tables and also into storage bins or racks when not in use.

BOOKLET FOR SUGGESTION AWARD AND MERIT SEALS

RUSSELL OSBORN, Assistant to Director of Personnel, The Carborundum Company, Niagara Falls

Part of the success in harvesting a better crop of ideas at Carborundum may be attributed to the innovation of certificates of recognition. Suggestion winners are given a booklet containing a certificate that has space for affixing special seals.

"Award Seals" are given with the initial cash award. A "Merit Seal" is presented for a valuable suggestion that for one reason or another is not eligible for a cash award. An "Additional Award" seal is presented to the winner of the Award Seal, if after six months of operation sufficient benefits have accrued to the company to warrant an additional cash award. In this event the amount is determined by estimating the savings for a year.

BOOK REVIEWER SAVES EXECUTIVES' TIME

H. O. ROBERTS, Personnel Director, Servel, Incorporated, Evansville, Ind.

A professional book-reviewer is saving many hours every day for busy executives at Servel. No longer do top men waste valuable time reading information they do not want for the sake of being sure they do not miss anything of importance.

All incoming books are digested in brief form, a few minutes' reading at most. Hundreds of magazine articles a month are highlighted for all types of readers. No attempt is made at actual condensation. The purpose is merely to answer one question: "Do I want to read this?"

After three years with the company, the reviewer is able to call articles to the attention of particular people with almost unswerving accuracy. About 75 executives receive most of the important digests and reviews; another 200 receive occasional digests of publications and articles of interest to foremen and supervisors.

This service was found particularly useful in connection with some special problems that arose. One notable, example was that of returning veterans. Hundreds of articles, pamphlets, books, and releases about the return of the veteran to industry were surveyed and digested. Servel feels that by virtue of this special work, it was able to do a better job of absorbing its returning veterans.

To eliminate dermatitis, Ford Motor Company, Dearborn, has set up a central station where all goggles, rubber gloves, and rubber boots exchanged by employees are washed, disinfected, and stamped "Sterilized" before being reissued

WORKERS HOLD OPEN HOUSE TO "SHOW OFF" BUILDING

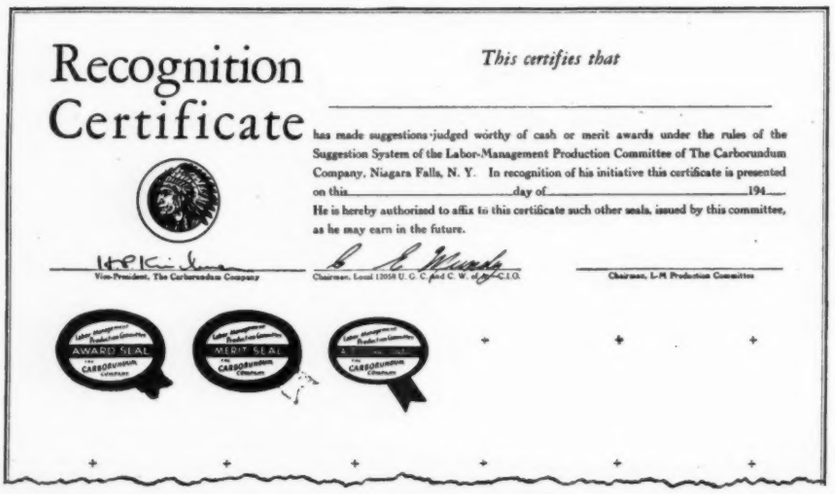
Employees at The Stanley Works, New Britain, Conn., were so proud of their new 7-story building that, reversing the usual procedure, they obtained management's permission and staged an open house on their own.

One floor of the new building, designed to house hardware line production, was taken over for four nights. As a result more than 20,000 Stanley employees, their families, and New Britain citizens at large inspected the building, special displays, and exhibits.

Nearly every item manufactured by the company was shown, and wall photographs called attention to twenty branch plants in the Stanley family, including factories in Canada and England.

Employees provided entertainment, but time and again the act that stole the show with the employee's family was the display sample of the kind of item the individual employee worked on. With undisguised admiration mothers, wives, children listened to the explanation of how such product as a steel roll was made. For the first time some of them were having a chance to see the facts behind the pay check.

Employees' families and visitors, also, could not help but be impressed by the comfortable work conditions—tinted walls, fluorescent lighting, modern surroundings. Personnel executives even reported a reaction in the employment office, where an immediate jump in employment applications was registered.


Recognition Certificate

This certifies that

_____

has made suggestions judged worthy of cash or merit awards under the rules of the Suggestion System of the Labor-Management Production Committee of The Carborundum Company, Niagara Falls, N. Y. In recognition of his initiative this certificate is presented on this _____ day of _____ 194____.

He is hereby authorized to affix to this certificate such other seals, issued by this committee, as he may earn in the future.

Vice-President, The Carborundum Company

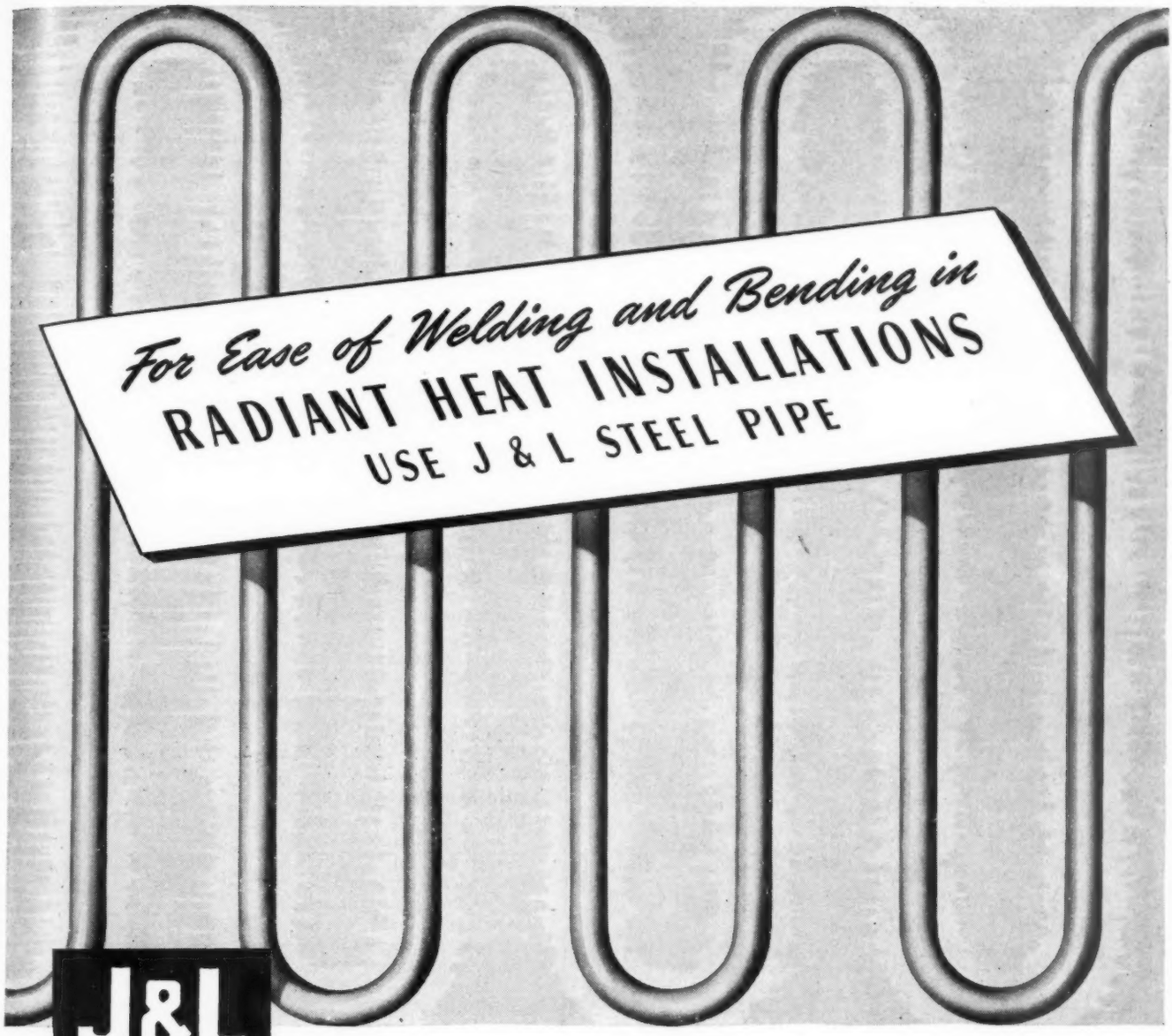
Chairman, Local 12058 U. G. C. and C. W. of C.I.O.

Chairman, L-M Production Committee

AWARD SEAL

MERIT SEAL

Three types of seals are given suggestion winners. They acknowledge cash, merit, and additional cash awards. These colored seals (blue and white, brown and white, black and gold) are pasted in the certificate booklet, where they are collected like savings stamps



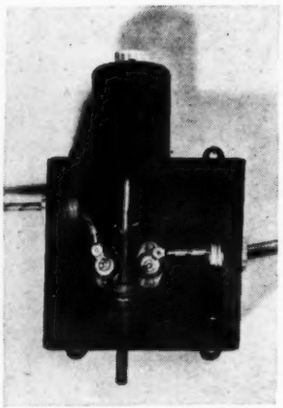
In installing radiant heating systems for homes and factories, J&L steel pipe has the ductility necessary to form readily. You can also weld it easily to obtain tight, leak-proof connections in the field. Use J&L steel pipe in your next radiant heating job and be sure that you are providing the best.

JONES & LAUGHLIN STEEL CORPORATION

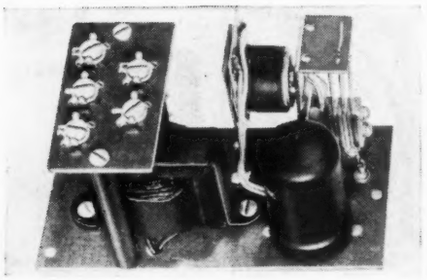
PITTSBURGH 30, PENNSYLVANIA

motors, controls, switches, and relays

Motors, controls, switches, and relays introduced to you by FACTORY during the past 8 months, are reviewed here to give you a quick summary

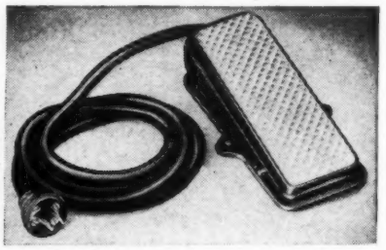


DISCONNECT SWITCH—solenoid-operated, is used in conjunction with static eliminators and with meters on high voltage switchboards. Line terminals are porcelain-mounted brass posts, on 1½-in. centers. The switch is designed to open a line carrying 100 milliamperes of 60-cycle a.c. and 10,000 volts above ground. Solenoid operates from a 115- or 230-volt, 60-cycle a.c. circuit. The Simco Company, Philadelphia.



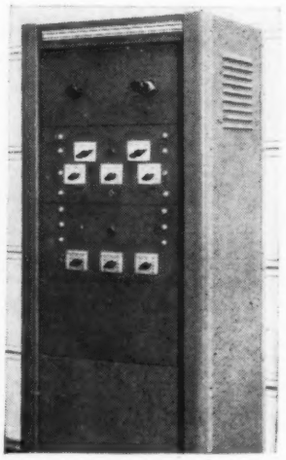
ELECTRONIC RELAY—Utilizing the hot cathode thyratron principle, electronic relay is claimed to have high load contact capacity, and to be suitable for photocell circuits, for direct controlling actuation of motors, valves, alarms, and similar equipment. Snap-acting, it trips by external contact carrying 3 microamperes, or external circuit whose value drops to 1 megohm pure resistance. Operates from 110-volt, 60-cycle a.c. Automatic Temperature Control Co., Philadelphia.

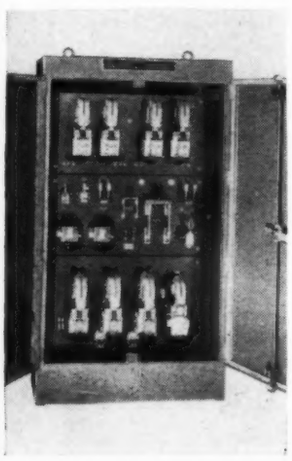
EXPLOSION-PROOF MOTOR—Lightweight, 2-hp. explosion-proof d.c. motor for continuous duty has an armature speed of 9000 r.p.m., it can be supplied for lower-output shaft speeds by inclusion of a built-in gear reducer. Shaft is ball-bearing mounted, and motor windings are protected with glass insulation and high-temperature varnishes. Motor can be supplied for operation on 28, 32, or 110 volts, d.c. Electrical Engineering & Manufacturing Corporation, Los Angeles.



FOOT PEDAL SWITCH—for series circuits is constructed of cast aluminum, and has screw holes for fastening to floor or machine. Treadle is non-slip diamond plate; switch has heavy rubber cord with non-shattering male plug. Mechanism is snap-action type, and can be supplied single pole, single throw or single pole, double throw. Power handling capacity is 1000 watts at voltages up to 220 a.c. or 32 d.c., non-inductive loads. Electronic Controls, Inc., Newark, N. J.

GRINDING MILL CONTROL—Electronic mill feed control for tube, ball, bowl, and other types of grinding mills, consists of a load detector outside the mill, and connected directly to the electronic component in the 66-in. steel cabinet. A circuit from the electronic equipment supplies a variable speed d.c. feeder drive motor. Speed is controlled continuously throughout a stepless range. Gai-tronics Corp., Washington, D. C.

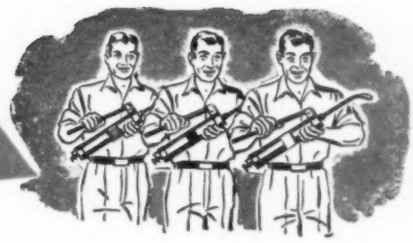




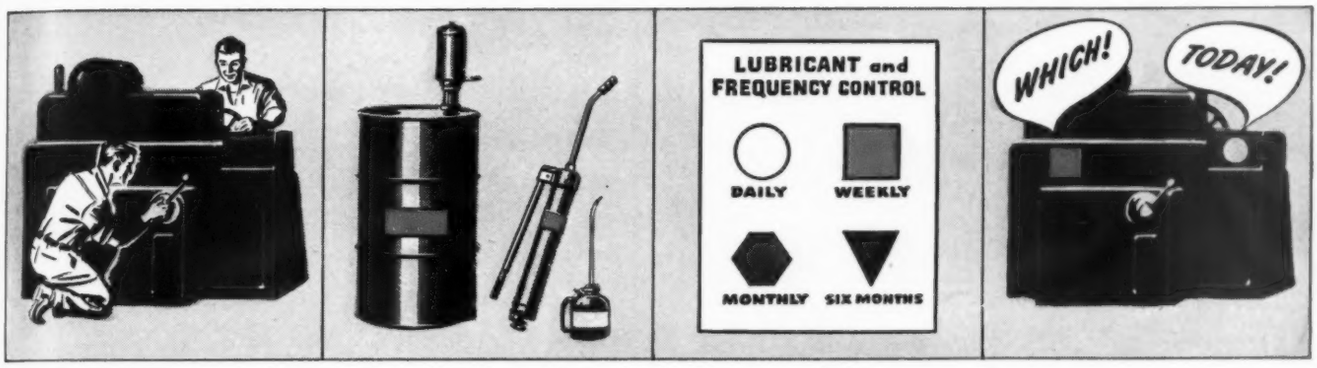
HEAVY-DUTY CONTROLLERS—are built for cranes, and other applications where service is severe and continuity of operation is necessary. Contactors are available with 8-hr. ratings of 100, 150, 300, and 600 amperes, and with mill ratings of 133 percent of those values. Pneumatic timers can be attached to the contactors or operated by separate magnet. Heavy-duty control relays perform undervoltage, interlocking, sequencing, and shunt field control functions. Square D Company, Milwaukee.

CONTINUED ON PAGE 163

Call out the "Color Guard" to cut lubrication failures and costs!



The A B C's of Alemite Coloroute System of Lubrication



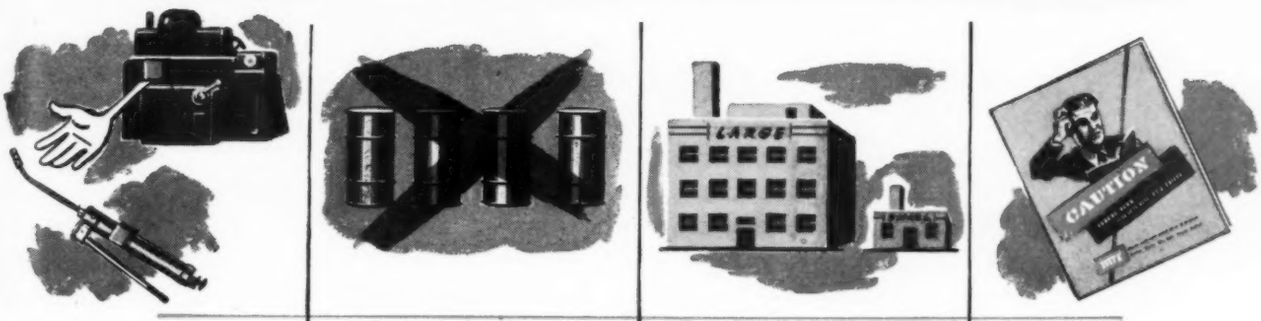
A. Each machine in your plant is analyzed to determine its lubrication requirements. This analysis is made by specialists and does not disturb production schedules.

B. Then each lubricant container and piece of lubrication equipment is "color identified." Thus there can be no mistake as to which lubricant or oil goes where.

C. Then color symbols which correspond to the color marking on the lubrication equipment and containers are applied at each fitting, gear case and oil hole.

D. The color of the symbol shouts "which" grease or oil. The shape of the symbol shouts "how often." If lubrication points are out of sight, the symbol shows where it is.

WHAT COLOROUTE DOES



A. It provides a complete "foolproof" plan of lubrication procedure that eliminates "human error." This alone can eliminate many bearing failures and lost production due to faulty lubrication.

B. Coloroute can reduce the number of lubricants required by 30% to 75%. The time required for lubrication is also materially reduced because all points are plainly color marked.

C. After once installed, it works for you automatically. Its economies and benefits are applicable to any plant, large or small. The Coloroute plan is used in every type of industry with amazing results.

D. Send for the new FREE booklet which describes the complete Coloroute Plan. Explains every step and tells how this plan will benefit you. Write today. Ask for the booklet "Caution." Alemite, 1870 Diversey Parkway, Chicago 14, Ill.

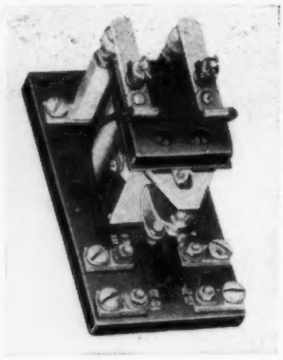
ALEMITE HELPS THE WORLD GO 'ROUND

Another Product of STEWART WARNER

ALEMITE

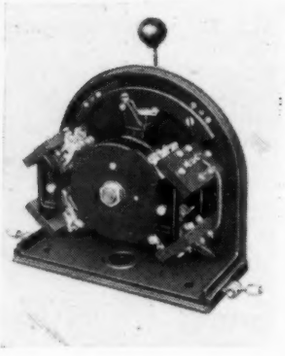
Alemite ALONE Combines all 3 in Lubrication

1. EQUIPMENT 2. PROCEDURES 3. LUBRICANTS

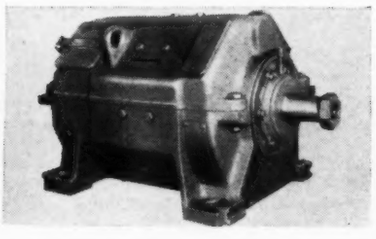


HEAVY-DUTY RELAYS—No. 130, are for light contactor duty, control of single-phase motors, and other remote or automatic control purposes. They incorporate accessible front-connected terminals, silver-to-silver contacts, and mechanical interlocks for reversing service. Operating voltages for d.c. are 6-230 volts, and for a.c. from 6-440 volts. Ward Leonard Electric Company, Mt. Vernon, N. Y.

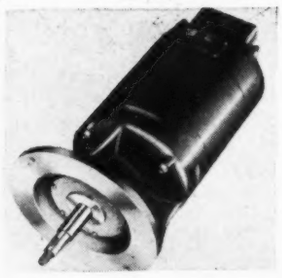
INDUCTION MOTORS—Replacement of cast-iron parts by steel has resulted in a motor more than 35 percent smaller than its predecessor, without sacrifice of electrical properties. Starting torques are said to have been increased as much as 134 percent per pound of motor weight, while maximum torques have been raised 116 percent. Equipped with sealed, prelubricated ball bearings. Made in splash-proof, open-protected, and totally enclosed fan-cooled types, in sizes up to 300 hp. Westinghouse Electric Corporation, East Pittsburgh.



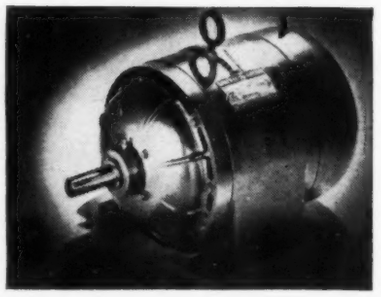
MASTER SWITCH—Made for use with mill and crane magnetic controllers, Type CM master switch has silver alloy contacts normally spring-closed and opened by 7-in. diameter cams. The cams permit throw of 37½ degrees for a 6-speed-point switch, and reduce mounting space required when several switches are installed. The Electric Controller & Manufacturing Company, Cleveland.



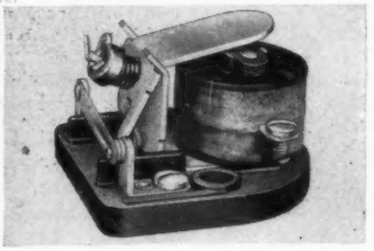
MILL MOTORS—Line of d.c. armored mill motors, Type MD-600, features increased horsepower in smaller space, in ratings from 5 to 200 hp. Has solid roller bearings, close-coupled. Adaptability of the frame to different enclosures allows changeover among protected, totally enclosed, or separately ventilated types. Reduction in size per horsepower is accomplished by maximum utilization of space in the machine. Motor Division, General Electric Company, Schenectady.



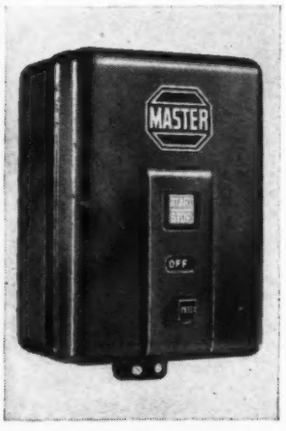
MOTOR—Fan-cooled, open-type, two-pole 3600-r.p.m. motor has output speed stepped up to 8000 r.p.m. by single-reduction helical gears in a sealed gear box. Manufacturer says it will deliver 5 hp. from 3-phase, 60-cycle, 220-volt power source. Electrical Engineering & Manufacturing Corporation, Los Angeles.



MOTOR—Totally enclosed in double-shell, cast-iron housing, fan-cooled motor is designed for use in dusty, dirty, and corrosive atmospheres. Available in standard, explosion-proof, and dust-explosion-proof types from 1 to 1000 hp., for use in Class I, Groups C and D, and Class II, Groups E, F, and G, hazardous locations. Incorporates regular features of Tri-Clad line. Motor Division, General Electric Co., Schenectady.



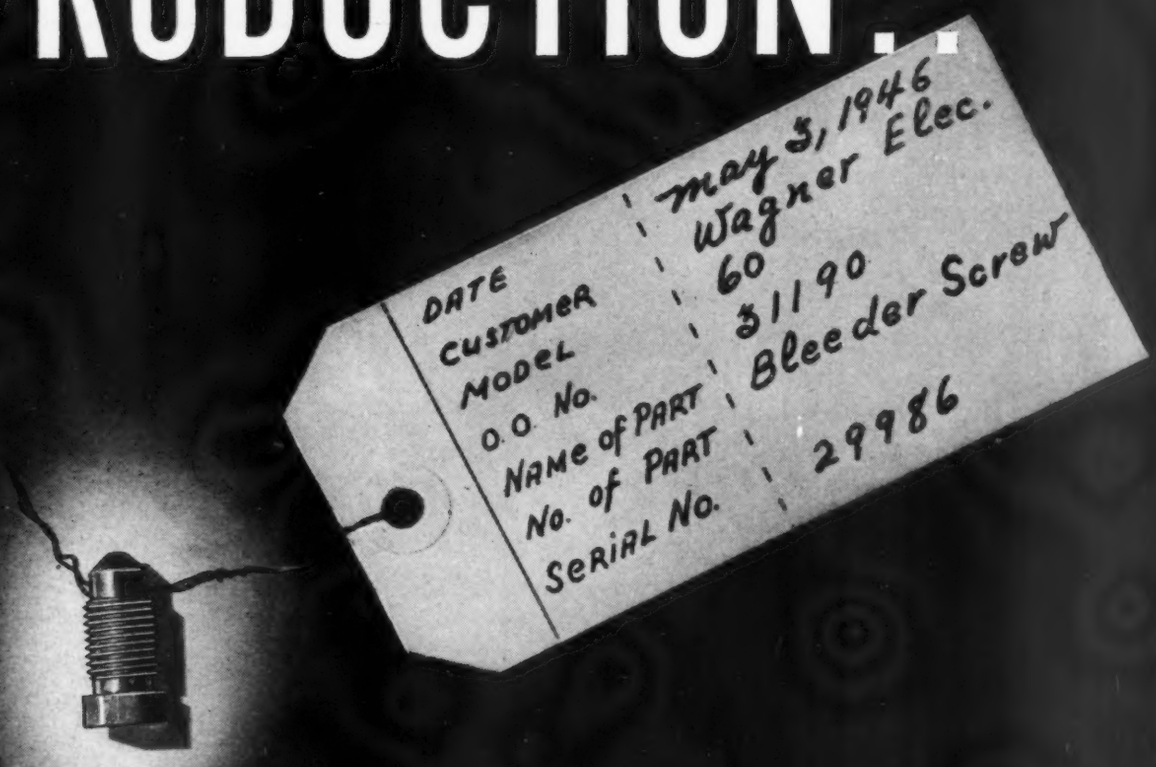
MOTOR STARTING RELAY—known as MS2A, is voltage-actuated, and operates on the back e.m.f. of the starting winding. No overload can prevent it from positive operation once proper motor speed has been reached, maker states. Operates over a range of line voltage variations, and can be used on normally low voltage lines with heavier current flow. May be mounted on motor housing or located at any distance. Potter & Brumfield Sales Company, Chicago.



MOTOR STARTERS—Featuring a single pushbutton for starting and stopping squirrel-cage motors, a.c. across-the-line motor starters are of the solenoid type with vertical straight line motion. One remote control station can be used with a starter of any voltage from 110 to 550, or frequency of 25 to 60 cycles. For applications where multiple remote control is required, a two-button station is available. Each bridge has contacts on both sides. Master Electric Company, Dayton.

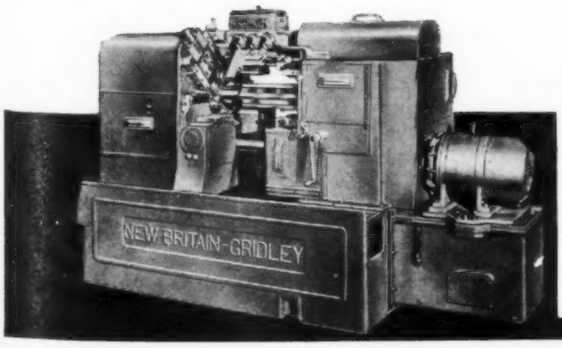
CONTINUED ON PAGE 170

PRODUCTION.



6 OPERATIONS
4.15 SECONDS PER PIECE
869 PIECES PER HOUR AVERAGE

New Britain Model 60 Multiple Spindle Automatic Screw Machine on which the part shown above is machined.

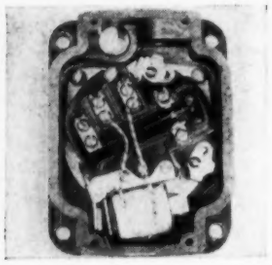


For more, better parts per hour this year and years from now, it pays to pick

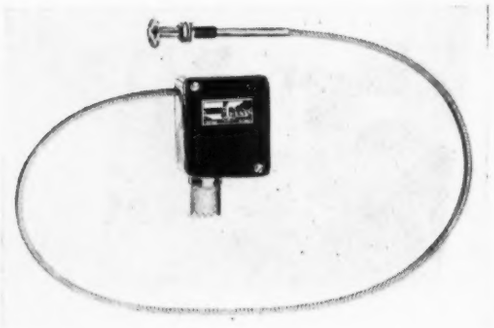
NEW BRITAIN

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

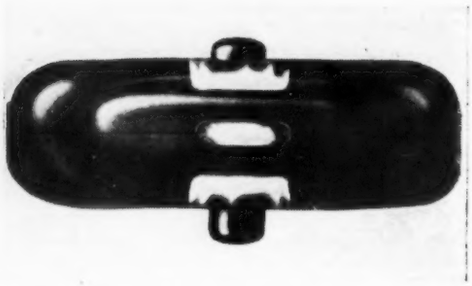
M—01051



PLUGGING SWITCHES—Line of oiltight, dustproof switches is designed to remove plugging power from a motor at the moment required. The silver contacts can handle directly the coil current of a 150-amp. contactor. Control Division, General Electric Company, Schenectady.

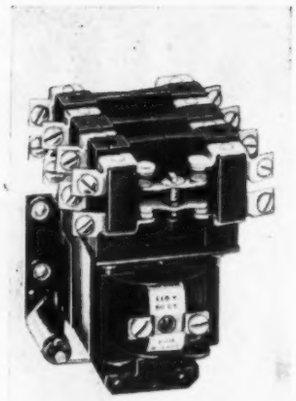


REMOTE SWITCH CONTROL—combines an electrical switch and flexible control to allow for remote switch operation. Adaptable to all types of small machine tools. Switchbox includes a 10-amp. switch, is constructed of cast aluminum, and has threaded boss to take standard ½-in. conduit. Arens Controls, Chicago.



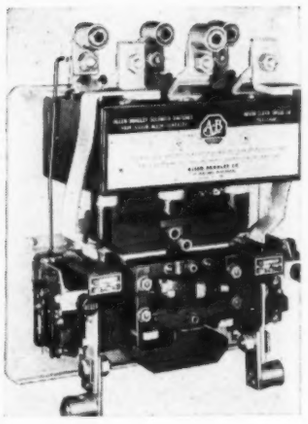
SAFETY SWITCH—Double-pole, single-throw push-through cord switch is designed to operate on electrical devices consuming up to 2500 watts a.c. or d.c., 125 or 250 volts. Switch is rated at 20 amperes at 125 volts. Mechanism consists of snap-action over-the-center spring-controlled tapered shaft, operated by push-buttons. Trilmont Products Co., Philadelphia.

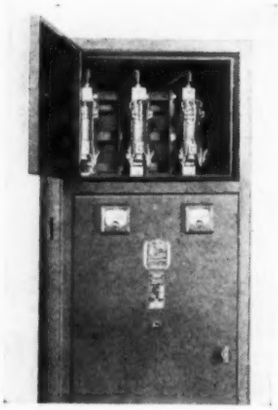
SNAP SWITCH—Self-contained, Class 9007 Type A snap switch is constructed to make or break a circuit in small space, with short movement and light pressure. Small in size (approximately 2½x1x⅞ inches), it operates on 550 volts. Square D Co., Milwaukee.



SOLENOID RELAYS—A simple shift of connections permits changing a set of normally open contacts to normally closed operation, or *vice versa*, in solenoid relays. Contacts on the 2- and 4-pole relays are universal, and the 6-and 8-pole types have only four sets of universal contacts. Relays have a maximum current rating of 10 amperes, non-inductive, and units range from 6 to 600 volts. The universal type is for switching circuits of like polarity, and cannot be used as reversing switches. Allen-Bradley Co., Milwaukee.

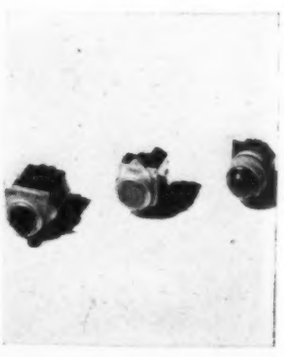
SOLENOID STARTER—Size 5, Bulletin 709, solenoid starter has a maximum rating of 100 hp., 220 volts, and 200 hp., 440-550-600 volts. The Cadmium silver double-break contacts are totally encased in an arc hood, each pole of the switch having its individual arc chamber. Arc-interrupting capacity is high, according to the manufacturer, and currents of at least ten times the maximum horsepower rating are easily interrupted. Allen-Bradley Co., Milwaukee.

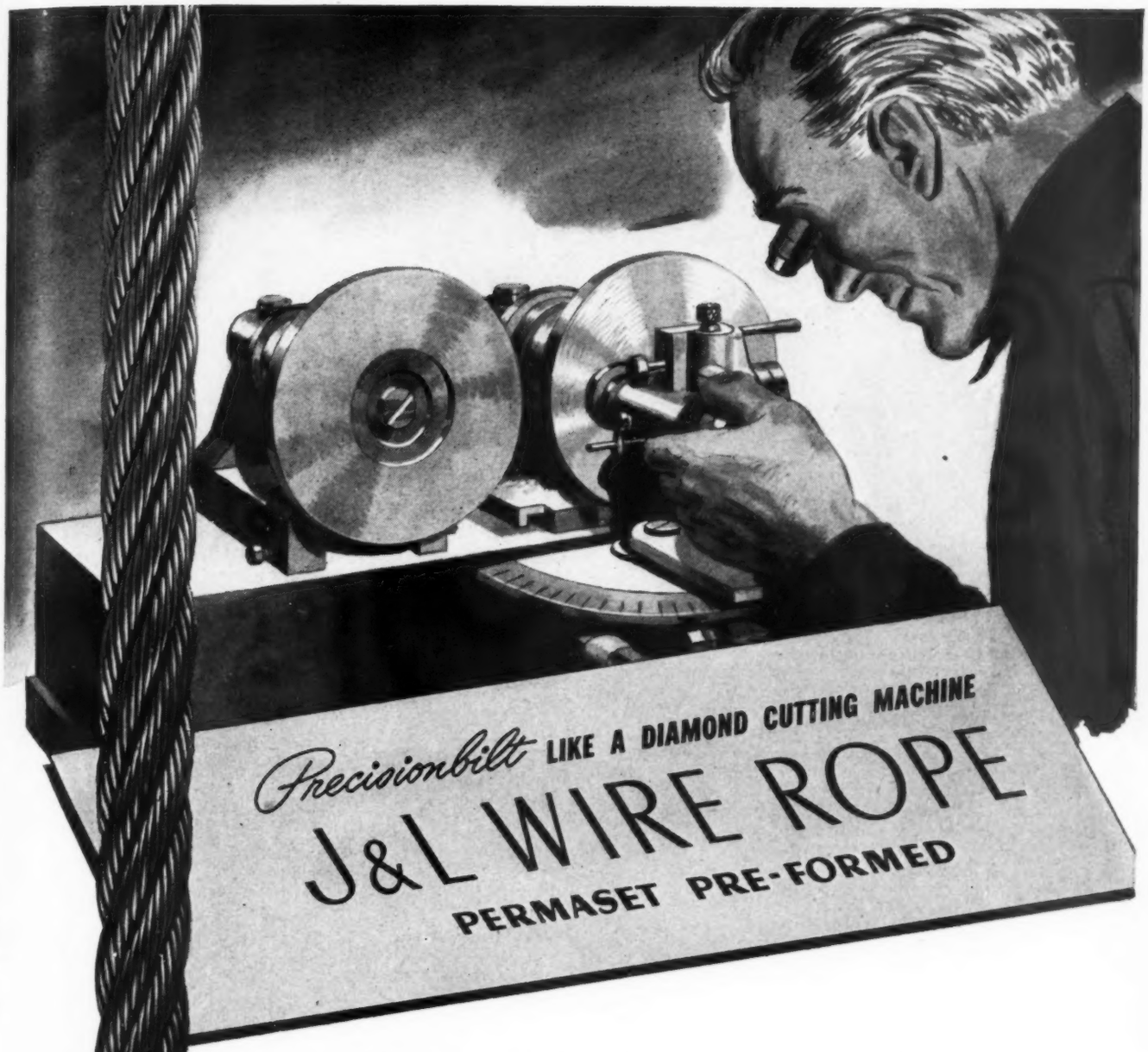




STARTERS—Hi-Fuse polarized field frequency synchronous motor controls with current-limiting fuses are suitable for high voltage service. Control provides disconnecting means, as well as short-circuit and motor overload protection. Furnished in ratings up to 5000 volts, with a current-interrupting capacity of 60,000 amperes asymmetrical. Enclosures available: NEMA types 1, 1-A, 5. Electric Machinery Manufacturing Company, Minneapolis.

SWITCHES, PUSHBUTTONS, AND INDICATING LIGHTS—are protected against entrance of oil by a diaphragm seal and a rubber gasket. The pushbuttons are made in several pole and circuit combinations. The selector switch unit is obtainable in single-pole double-throw, or double-pole single throw forms. Contacts are cam-operated. Control Division, General Electric Co., Schenectady.





Precisionbilt, like a diamond cutting machine, J&L Permaset Pre-formed Wire Rope will give you increased rope life. Just as diamond cutting is done by highly skilled men of long experience, J&L Wire Rope is made by men who have for years produced the best in wire rope.

The long service of J&L Wire Rope on any job reflects the quality of the steel from which it is made—J&L Controlled Quality Steel.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

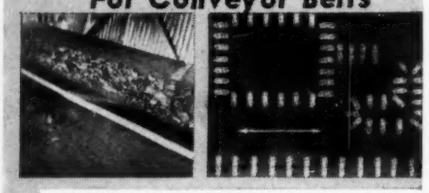
PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE

Present Day Practice in Belt Fastening

Every man who has anything to do with the purchase, application or maintenance of conveyor, transmission or V-belts will find the bulletins listed below of considerable value in connection with belt fastening work. A knowledge of present day practice in belt fastening helps reduce the loss in machine hours due to belt failures caused by the use of the wrong type of fastener or improper application. We shall be glad to send any or all of them to you or to any of the men in your organization.

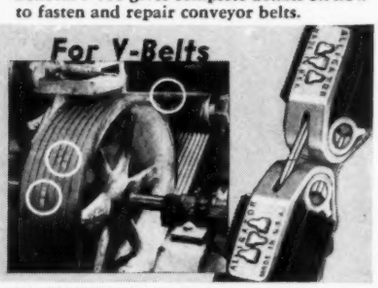
For Conveyor Belts



FLEXCO HD Belt Fasteners are used to make a "water-tight" butt joint in conveyor belts ranging from ¼" to 1½" thick and of any width. The view on the right shows the various types of rips and patches that can be made with these fasteners and Flexco HD Rip Plates.

Bulletin F-100 gives complete details on how to fasten and repair conveyor belts.

For V-Belts



ALLIGATOR V-Belt Fasteners are now being widely used to fasten B, C and D, open-end V-belting of cross woven fabric core construction now being made by most belting manufacturers. The view at the left shows a typical application of these fasteners to a drive where endless V-belts would require dismantling the machinery to put the belts on the sheaves.

Bulletin V-205 gives complete instructions on how to use V-belt fasteners.

FLEX V Fasteners for A and B belts are also available for lighter duty V-belt drives. Ask for **Bulletin V-14.**

For Transmission Belts

ALLIGATOR Steel Belt Lacing is in world-wide use to make smooth, flexible joints in leather, rubber, balata, stitched canvas or solid woven belts up to ⅜" thick and as wide as they come.

Bulletin A-60 tells how to fasten and repair transmission belts.

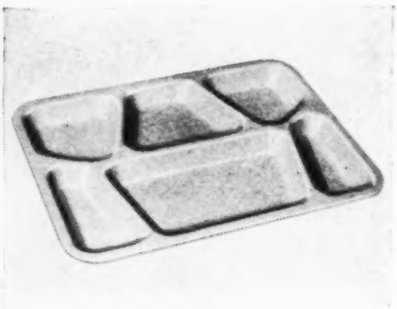
Sold by Supply Houses Everywhere

FLEXIBLE STEEL LACING COMPANY
4678 Lexington Street, Chicago 44, Ill.

what's new in equipment

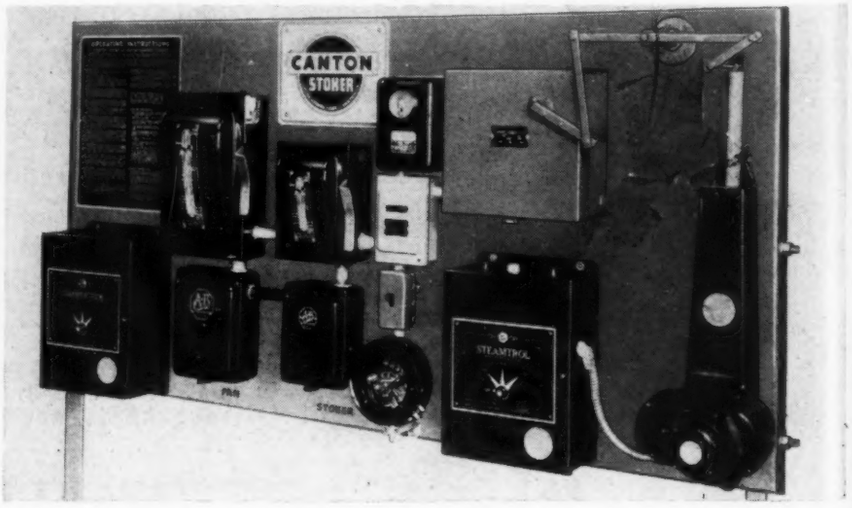
INSULATED FOOD TRAY

Plastic serving tray has six individual food wells, each separated and insulated to retain the proper relative temperatures for every dish in a complete meal, serving both hot and cold foods on the same tray. It is shock-resistant, marproof, and cannot warp. Has hard, tile-like surface and rounded edges, and sharp cutlery, abrasive cleansers, or hot or cold water are said to have no damaging effects. It does not stain or retain food odors. Lightweight, it makes no metallic clatter, and has molded-in finger grips. Mack Molding Co., Main St., Wayne, N. J.



COMBUSTION CONTROL

All-electric combustion control system is said to simplify installation, and in most cases to reduce installation and operating costs. The variation in coal feed on the stoker itself is effected electrically, and one or more stokers can be synchronized electrically at the same time. The unit keeps in balance the coal feed, forced air, and stack draft by means of a master steam pressure regulator which synchronizes the flow of elements producing combustion from one central point. Ten to 15 percent savings in fuel are claimed for the system. Canton Stoker Corp., Andrew Pl., S.W., Canton, Ohio.

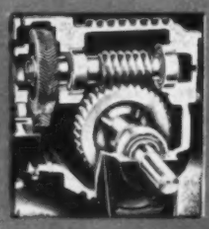


JET PUMP

Transfer of liquids, draining of tanks and vats, removal of water from flooded areas, and similar functions are covered by Accel-O-Rate jet pump. Available in three stock models, ranging in capacity from 85 to 350 g.p.m. Water under pressure from pumps or mains is used in a high velocity jet to produce the pumping action. The unit has no moving parts, and handles fluids containing dirt, sludge, and similar solids. The small, portable pump operates in any position, and uses

the RIGHT *horsepower*

the RIGHT *shaft speed*



the RIGHT *mounting*

All of these . . . the explosion-proof motor, the gear-reduction unit and the flange mounting . . . all are standard Master units that easily combine into one compact, integral power drive for this double action proportioning pump. This integral construction permits many parts to be stripped away from both the power unit and the completed machine and pays off handsomely in savings in material . . . savings in space.

Probably you will not need exactly this same combination of features, but Master Gearmotors are available in any size from 100 down to 1/10 horsepower and in all cycles, phases and frequencies . . . in open, splash-proof, fan-cooled and explosion-proof types . . . with Speedrangers and Unibrakes . . . for every type mounting . . . and over a gear reduction range up to 432 to 1.

Use Master Gearmotors to increase the salability of your motor-driven products . . . improve the economy, safety and productivity of your plant equipment. They're the horsesense way to use horsepower.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

MASTER GEARMOTORS

Handling Problems Deserve *Special* Attention

EVERY manufacturer, in striving to keep costs at a minimum, must deal with more or less difficult material handling problems. These are not always quickly solved, and usually require considerable thought by plant and conveyer engineers. Most experienced plant engineers agree that the use of Mathews methods and Mathews equipment means efficient material handling. That is why Mathews Engineers are usually called in on the problem requiring special attention. There are many types of Mathews Conveyers of both gravity and power designs, and from these types are selected the units which make up Mathews continuous flow conveyer systems. It is with such systems that prominent manufacturers are reducing worker fatigue and keeping materials moving through processing machinery, storage and shipping, with a minimum of product re-handling, costly confusion and delay.

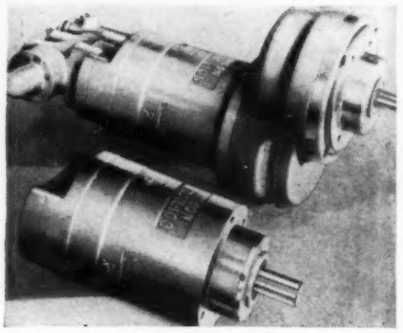
It might be that a Mathews Engineer can show you what others in your industry have done to improve their material handling. We will welcome your inquiry and give it prompt and thorough service.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA
SAN FRANCISCO, CAL. • PORT HOPE, ONT.
ENGINEERING OFFICES IN PRINCIPAL CITIES

ordinary soft hose for its connection. Can be used with centrifugal pumps to increase the vertical lift to over 100 feet, and the horizontal reach to over 300 feet. Derbyshire Machine & Tool Co., Jet Pump Div., 5215-X Belfield Ave., Philadelphia 44.

FLUID MOTOR

Controlled variable speed and instant speed-up control for any rapid traverse need are said to be provided by fluid motor of axial piston design. Available in 3- and 5-hp. capacity, with or without a speed control valve, with or without a choice of geared-head units of various gear ratios, and with a selection



of brackets for mounting the motor in position desired. The motor proper features "floating drive," which maintains constant pressure contact between the driving and driven elements without using mechanical linkages or connecting rods. This eliminates the effects of backlash or inertia resulting from sudden starts, stops, and reversals. Self-starting, the motor operates in either direction, and is self-lubricating. The Denison Eng. Co., Columbus 16, Ohio.

FACE SHIELD

Protecting the worker on jobs such as babbitting, handling chemicals, and in the manufacture of high octane gas, face shield guards against impact of flying particles and splashes of acids, oils, alkalis, and hot water. The large window, 18¾x10 inches, made from .040-in.-thick, cellulose acetate, extends com-

Speed Nuts*

Give You More Assembly Advantages

Than Any Other Nuts, Regardless of Price

REVENT VIBRATION LOOSENING

SPEED NUTS prevent vibration loosening because they provide a *double* spring-tension lock that *absorbs* vibration instead of merely *resisting* it. Insures a tight attachment for the life of the product.

PRING TENSION RESILIENCY

In the assembly of porcelain enamel, plastic or glass parts, SPEED NUTS provide the tension necessary for a tight assembly, yet are sufficiently resilient to prevent damage due to expansion and contraction, vibration or shock.

PPLIED FASTER

SPEED NUTS put wings on your assembly lines because they start easier, pull down faster and no wrench is required to keep them from turning. Made also for use with coarse-thread sheet metal screws, requiring fewer turns to tighten, for still faster application.

LIMINATE LOCK WASHERS

You can boot lock washers out the window, for SPEED NUTS are self-locking. They cut both material and handling costs. Because of their wide bearing surface, SPEED NUTS also can eliminate the use of spanner washers.

SELF-RETAINING

Many types of SPEED NUTS lock themselves in screw-receiving position for "blind" location assembly, eliminating expensive welding, riveting or clinching operations.

PERFORM MULTIPLE FUNCTIONS

Like a one man band, many special types of SPEED NUTS perform multiple functions, replacing two or more parts. SPEED NUT prongs can be incorporated in almost any shape or form to do the job easier and faster.

LOCK ON UNTHREADED STUDS

"Push-On" SPEED NUTS need only be pushed over rivets, nails, tubing, or unthreaded studs to lock parts so securely, you can't wrestle them off. Costly threaded inserts, drilling and tapping are eliminated—molding costs reduced—assembly speeded up.

WILL NOT CLOG

Having no threads, SPEED NUTS cannot clog with paint. No assembly delay for re-tapping threads. This is particularly important where SPEED NUTS are permanently attached to parts for blind assembly.

WILL NOT "FREEZE" TO THREADS

Having no threads, SPEED NUTS will not "freeze" to rusting bolts. They can be easily removed at any time for servicing or replacing. You'll save the repair men a lot of cussing.

WEIGH LESS

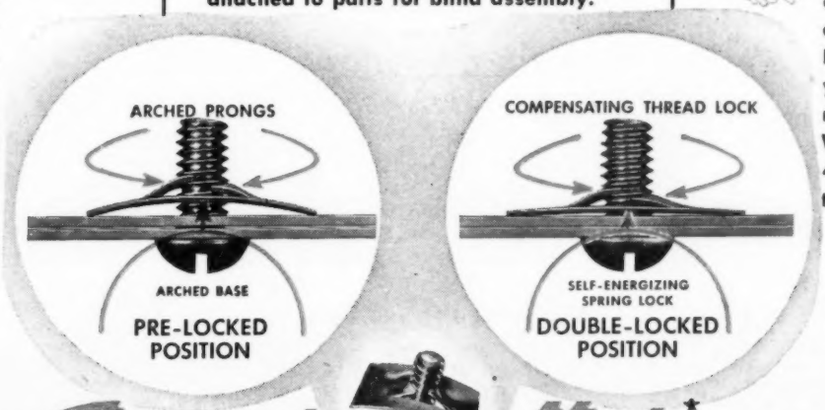
Because they are made of sheet metal instead of bar stock, SPEED NUTS are in the "featherweight" class compared with threaded nuts. By eliminating lock and spanner washers and other unnecessary parts, weight is reduced still further.

MINIMIZE SHIPPING DAMAGE

SPEED NUTS give you free insurance against shipping damage. They provide a resilient lock that defies loosening and prevents cracking of enamel and glass. With SPEED NUTS, your products will reach your customers in perfect condition.

SEND TODAY

We're not fooling about these advantages. They are very real and worth-while as any SPEED NUT user will tell you. Rush your assembly problems to us now, giving complete details. We'll show you which of the 4000 shapes and sizes will do the trick for you.



CANADA:
Wallace Barnes, Co., Ltd.
Hamilton, Ontario

ENGLAND:
Simmonds Aerocessories, Ltd.
London

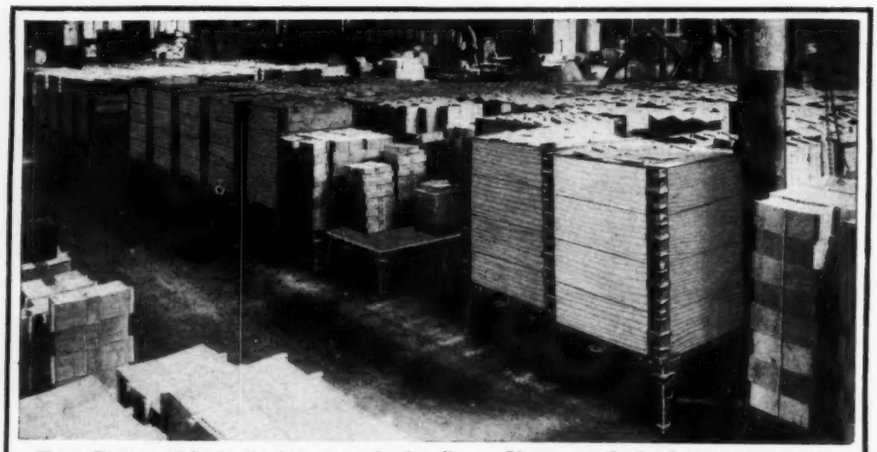
IN FRANCE:
Aerocessoires Simmonds, S. A.,
Paris

IN AUSTRALIA:
Simmonds Aerocessories, Pty. Ltd.,
Melbourne

ERMAN PRODUCTS, INC. Speed Nuts* 2096 Fulton Road, Cleveland 13, Ohio

* Trade Mark Reg. U. S. Pat. Off. PATENTED

ASTEST THING IN FASTENINGS . . . MORE THAN 4000 SHAPES AND SIZES



These Bins go right to the job on production lines. Always ready for instant removal on Turner Transports.

"If You Use Stationary Bins Your Costs Are Too High!"

Eliminate Lost Motion with

THE TURNER SYSTEM

OF MATERIALS HANDLING

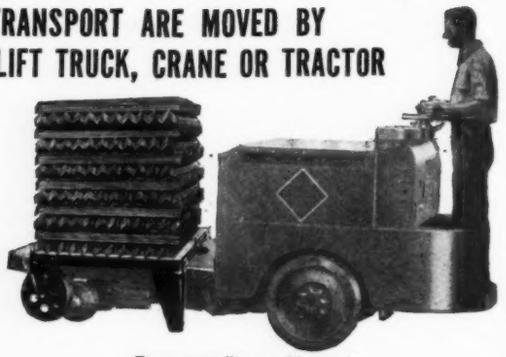
You can't escape high costs as long as you use stationary bins. Putting materials *in* and taking them *out* means *time* and *labor*. With the TURNER SYSTEM OF MATERIALS HANDLING you *deliver the bin right to the job — and save the extra handling!*

Always the RIGHT SIZE Bins

Wooden Side or All-Steel Bin Sections fit one on top of another on the Turner Transport. Sections are removed as load diminishes —added as load increases. No "diving" or stooping into wrong-size bins.

BINS ON THE TURNER TRANSPORT ARE MOVED BY HAND "JIMMY," POWER LIFT TRUCK, CRANE OR TRACTOR

Every Box, Bin, Shelf and Rack
STANDARDIZED — INTERCHANGEABLE
Movable on the Turner Transport



Transport fits on lift truck.

Write today for:

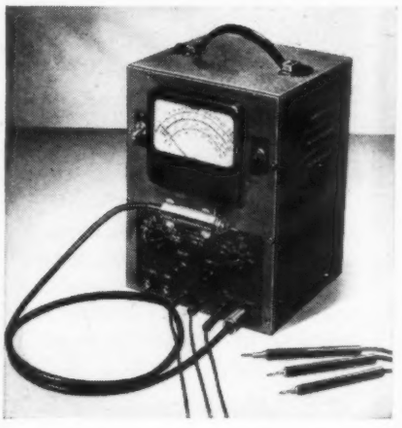
1. Our 60 Day Free Trial Offer
2. Descriptive Catalog on the Turner System

FACTORY SERVICE COMPANY
4605 N. TWENTY-FIRST STREET MILWAUKEE 9, WISCONSIN

pletely around the face, covering the ears. Fiber head guard protects the upper forehead and covers the entire top of head. The headgear is made for comfort, and headband slides in a fiber sleeve in back, permitting adjustment to varying head sizes. Leather sweatband absorbs perspiration, and friction joints hold the window securely in "on" or "off" guard position. American Optical Co., Southbridge, Mass.

ELECTRONIC TESTER

Electronic test instrument measures voltage, current, and resistance values in circuit components operating with frequencies up to 300 mc. Permits isolating condensers, coils, and resistors when faults occur, and checking circuit operation after replacements are made. Type 134 Polymeter features preset fac-



tory adjustments permitting correct zero setting for all ranges through one front panel adjustment, convenient range switch, and five jacks for plug-in test-lead readings of a.c. volts, d.c. volts, ohms, amperes, and milliamperes. Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18.

GEAR LUBRICANT

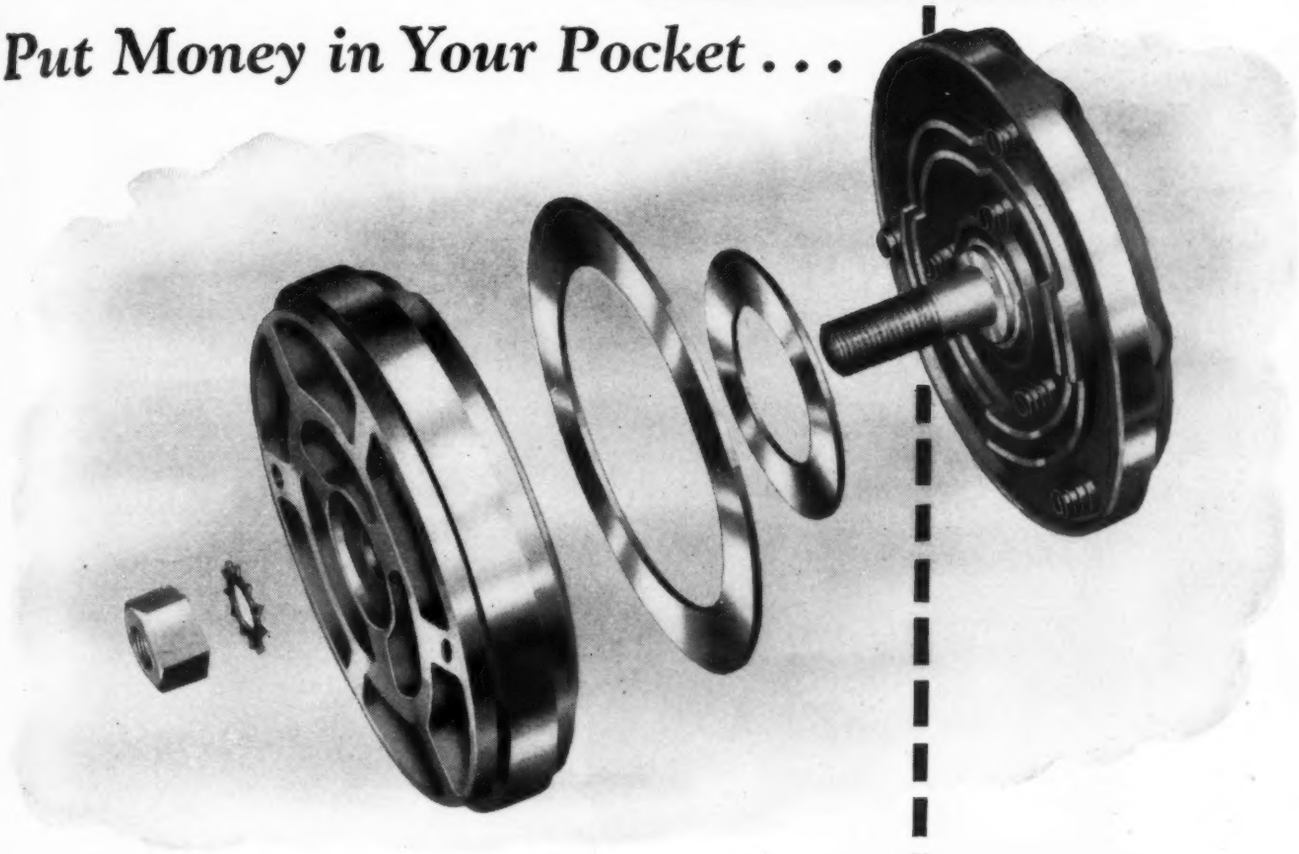
Brushed or sprayed on open gears, lubricant called Texaco No. 2-X Fluid contains a base material which is said to have high adhesiveness, cut back with a non-flammable solvent. This combination results in a lubricant which is both efficient and easy to apply, maker states. The Texas Co., 135 East 34 St., New York.

ADJUSTABLE LADDER STEP

Constructed for extension- and rung-type ladders, adjustable step provides a safe, comfortable surface for standing at any height up and down the ladder. The platform is made of solid seasoned hardwood, and the supporting frame and clamps are heavy-gage steel said to withstand a load of 5000 pounds. Metal parts are heavily cadmium plated for protection against rust. The four holding clamps are adjustable, and may be set

Why Gardner-Denver CUSHIONED Valves

Put Money in Your Pocket . . .



This is a Gardner-Denver Duo-Plate Valve. Examine it carefully. It's one reason why Gardner-Denver Compressors have such high delivery capacities—with lowest power consumption per foot of air delivered.

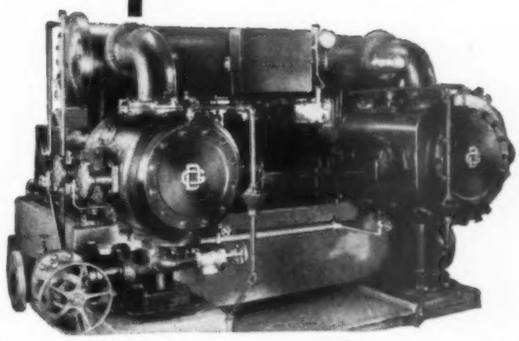
The discs of these Duo-Plate Valves trap air beneath them as they seat against the stop plate. This trapped air cushions impact—the greatest single cause of valve wear. Longer valve life with silent operation is assured.

The valve discs are free to *rotate* against the seat. Thus, because of "wearing in," the fit actually becomes better with use!

Gardner-Denver Duo-Plate Valves are double ported—have maximum area for a given diameter that means high sustained efficiency.

Experience in hundreds of installations shows that Gardner-Denver Duo-Plate Valves require a minimum of replacement—and keep their high efficiency.

Be sure *your* air compressor is equipped with Gardner-Denver Duo-Plate Valves. It will be—if it bears the famous G-D emblem!



Gardner-Denver Class HA 2-Stage Horizontal Compressor. Available in capacities from 316 to 2012 cubic feet displacement per minute. Five-step capacity control and Gardner-Denver Cushioned Duo-Plate Valves, of course.

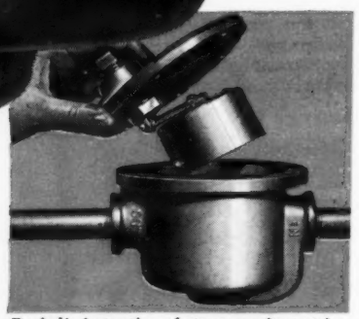
For full information, write Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER

Since 1859

HOFFMAN SERIES 600

INVERTED Bucket Traps FOR STEAM SERVICE



Periodic inspection of steam equipment is a maintenance "must" today. This Hoffman Bucket Trap can be opened up, examined and put back into service with a minimum of time and effort.

STURDY.. COMPACT.. EFFICIENT . . . only begin to describe this newest achievement of Hoffman engineers. Designed to meet the exacting requirements prescribed by varied applications, the Series 600 Hoffman Inverted Bucket Trap *assures high operating efficiency because of its simplicity.* It is so constructed that all working parts are mounted on the bonnet—*easily removed for cleaning without breaking pipe connections.* All parts subject to wear are of stainless steel—can be easily and inexpensively renewed.

By a simple change in valve seats, the Series 600 Trap is adjustable to a wide choice of pressures—another design feature that provides wide versatility in applications of each unit. Available for steam pressures up to 200 lbs.—capacities to 4450 lbs. water per hour.

Send today for your copy of the new Hoffman Series 600 Bulletin.

HOFFMAN

VALVES • TRAPS • PUMPS

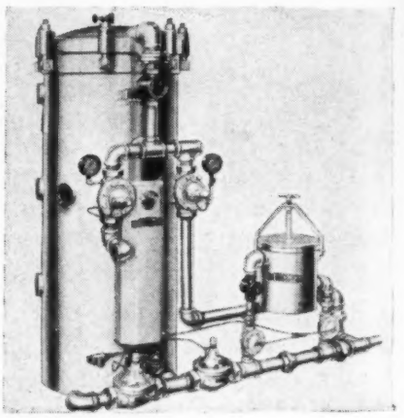
HOFFMAN SPECIALTY CO., 1001 YORK ST., DEPT. FM-12 INDIANAPOLIS 7, IND.

Makers of Valves, Traps, Vacuum and Condensation Pumps, Forced Hot Water Heating Systems.
Sold by leading wholesalers of Heating and Plumbing Equipment.

so that the step cannot be removed by any sweeping blow. The lower clamps can be reversed to grip the rung from the top, in order to move the step to another rung while working above the ground. Tara Mfg. Co., 2516 South Archer Ave., Chicago 8.

WATER FILTER

Known as the Figure 611 Series, water filters range in capacity from 15 to 500 g.p.m. with 7 to 248 square feet of filtering area. Filtered impurities are periodically backwashed to waste to improve sanitary conditions, and no manual cleaning operations are required. Filter



elements are tubular, plastic impregnated cartridges which support the filtering medium. Diatomaceous earth is deposited evenly on the cartridges from the precoat pot, and removes particles as small as ½ micron, including all dirt, oils, and other foreign matter. Bowser, Inc., Fort Wayne, Ind.

RECIRCULATING PUMP

Ten inches high, and weighing 7 pounds, recirculating pump has a water output of 2 g.p.m. at 72-in. head. The outlet pipe is ¼ inch. The unit is built for circulating coolants for lathes and other machine tools, for evaporative coolers, for spot welding, and other light industrial uses. The 1/50-hp. motor, totally enclosed in an aluminum case, is cooled by an external fan. The stainless steel shaft is 5/16 inch, and has a left-hand thread to the brass impeller. Pump stand

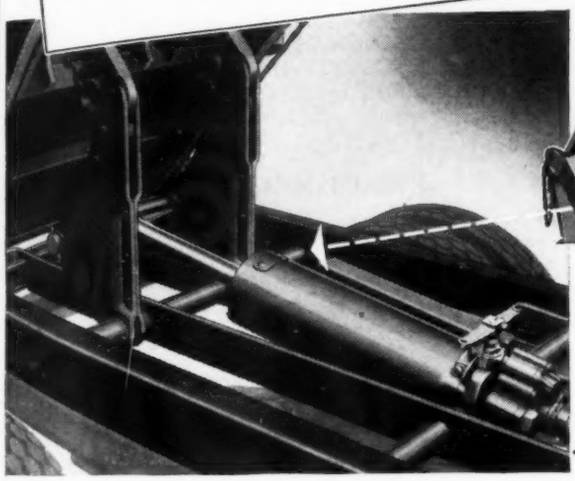
Problem ~~TROUBLE~~-SHOOTING *with* SEAMLESS STEEL TUBING

Disposing of a Design Dilemma

DUMP TRUCK INDUSTRY

The Problem: To provide solid support for hoist cylinder and arms, without increasing the weight of the assembly.

The Answer: OSTUCO Seamless Steel Tubing, light enough to meet design requirements, yet capable of withstanding the strains and loads to which it will be subjected.



PHOTOS COURTESY OF THE GALION ALLSTEEL BODY CO.

The heavy loads and severe stresses to which a dump truck hoist is constantly subjected calls for sound design and precise manufacture of hoist supports, through which the weight and stresses are distributed throughout the entire frame and chassis. OSTUCO Seamless Steel Tubing, inherently strong and lightweight, used in the hubs of the hoist supports, helped solve this difficult design problem.

OSTUCO tubing has helped solve design and production problems in a host of industries . . . it may well be the answer to *your* problem. OSTUCO'S experienced engineering, skilled craftsmanship* and on-time delivery record are available to manufacturers. Your copy of "M-1", a valuable booklet on steel analyses, tolerances and machining methods will be mailed on request.

**The OSTUCO tradition of quality manufacture is as old as the history of tube-making itself. Charles Sharkey, Bench Room Foreman and member of the OSTUCO 50-year Club, is one of many veterans who have spent a lifetime maintaining that tradition.*

THE OHIO SEAMLESS TUBE COMPANY

OSTUCO — SHELBY, OHIO

SALES OFFICES: Chicago 6, Illinois, Civic Opera Bldg., 20 North Wacker Dr.; Cleveland 14, Ohio, 1328 Citizens' Bldg.; Detroit 2, Michigan, 2857 E. Grand Blvd.; Houston 2, Texas, 927 A M & M Bldg.; Los Angeles, Calif., Suite 200-170 So. Beverly Drive, Beverly Hills, California; Moline, Illinois, 225 Fifth Avenue Bldg.; New York 17, New York, 70 East 45th Street; Philadelphia 9, Pa., 123 S. Broad St.; St. Louis 6, Missouri, 1230 North Main St.; Seattle, Washington, 1911 Smith Tower; Syracuse, New York, 501 Roberts Ave.; Tulsa 3, Oklahoma, Refining Engine & Equipment Co., 604 Ten E. 4th St. Bldg.

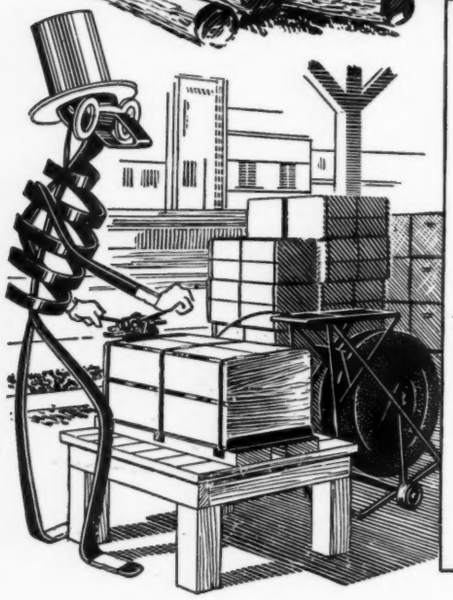
• Canadian representative: Railway & Power Engineering Corp., Ltd. Hamilton, Montreal, Noranda, North Bay, Toronto, Vancouver, Windsor and Winnipeg.

Plant and Main Office
SHELBY, OHIO

MANUFACTURERS OF SEAMLESS AND ELECTRIC-WELD STEEL TUBING

Adventures of Doc. *Steelstrap*®

® REG. U.S. PAT. OFF.



A lot of the romance—and a lot of the danger, delay and loss — has gone out of the logging business. A bundle of 65 prospective telephone poles strapped together ride a truck to the river bank, then float downstream to the mill.

Lemon peels for mincemeat travel in these cases. ACME STEELSTRAP eliminates nailing the cover on the case — no chance for nails or wood splinters to get into the lemon rind.

LOGS or *Lemon Peel*

Both *"bound to get there!"*

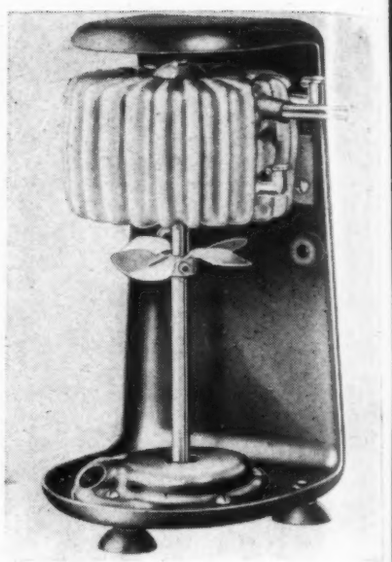
says Doc. *Steelstrap*

Whatever it is, any shipment travels better when it is bound in steel with ACME STEELSTRAP or UNIT-LOAD BAND. For the details on how much you can save — in time, labor, materials, shipping costs — call or write the Acme office nearest you.

ACME STEEL COMPANY

ACME STEEL CO. CHICAGO

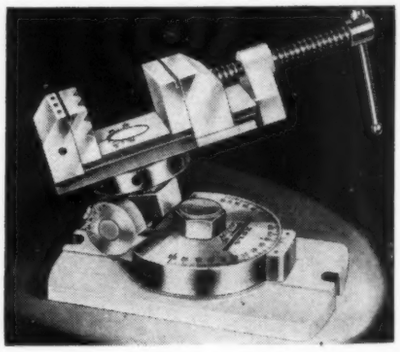
NEW YORK 7 ATLANTA CHICAGO 8 LOS ANGELES 11



is made from 16-gage steel, and is mounted on rubber vacuum feet for vibration damping. The pump is supplied in either 110 or 220 volts, 50/60-cycle, shaded pole 3350 r.p.m. Dan Morey, 814-16 South Robertson Blvd., Los Angeles 35.

PRECISION VISE

Suited for die, gage, and fixture drilling, grinding, and bench work, vise holds work at practically any required angle, vertical or horizontal. Driv-Wheel movement gives a 2¾-in. lateral clearance, and vise has double swivel construction. It is made plain, plain swivel



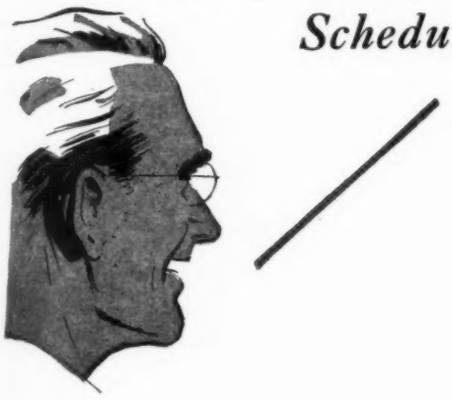
base, air production, and in the model shown, which is available with 3½- or 4½-in. jaw sizes. In addition to hardened, ground, and replaceable jaws, V-grooved jaws are furnished. Has floating jaw for instant gripping. Machinists Tool Co., 2830 West Lake St., Chicago 12.

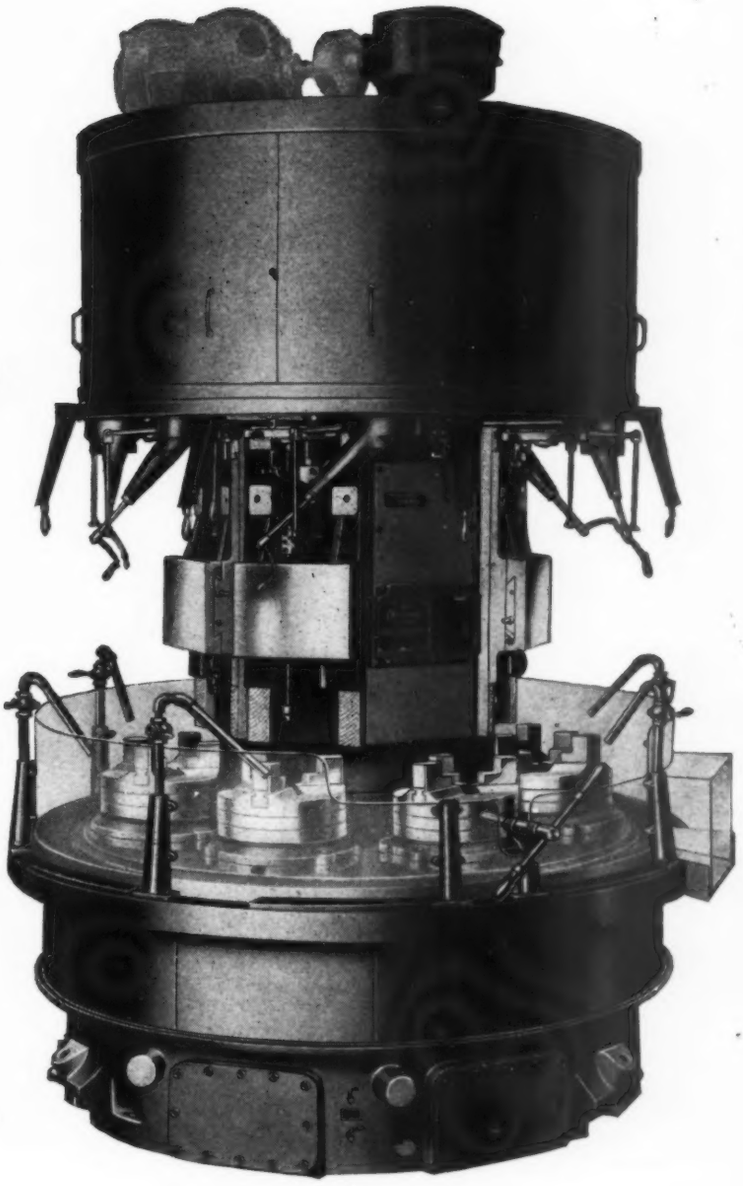
FLOOR CRANE CONTROL

Pendant pull-station control, for floor-operated cranes ranging in size from simple hoists to three-motion bridges, is claimed to provide them with the same smooth operation and control refinements as cab-operated cranes. Furnished for use on a.c. or d.c. with motors up to 15 hp. at 220 volts. The system consists of a small magnetic control panel mounted on the crane and con-

A Special-Purpose Machine for Long Runs

A Versatile Machine for Diversified Schedules





A MULT-AU-MATIC IS BOTH

Bullard Type D MULT-AU-MATICS are made with 6 or 8 spindles in 4 sizes for work up to 23" diameter.

Many Bullard Mult-Au-Matic users tool them up and let them run on the same job for years. No other machine has such an outstanding production record on high-speed, heavy-feed, tough-metal, continuous operation.

Other Bullard Mult-Au-Matic users find short runs profitable because change-over from one type of work is relatively simple. That's because the Universal, Convertible Double-Purpose and Auxiliary heads are quickly and easily set up for new operations. Moreover, each tool head has 82 independent feed rates... and each spindle has 41 independent speeds. ***Bullard Engineering Service can help you simplify your retooling requirements.***

Complete data describing the ability of Mult-Au-Matics to make long runs and diversified schedules profitable are contained in Bulletin MAM-D7-6-45.

The Bullard Company, Bridgeport 2, Connecticut.

BULLARD

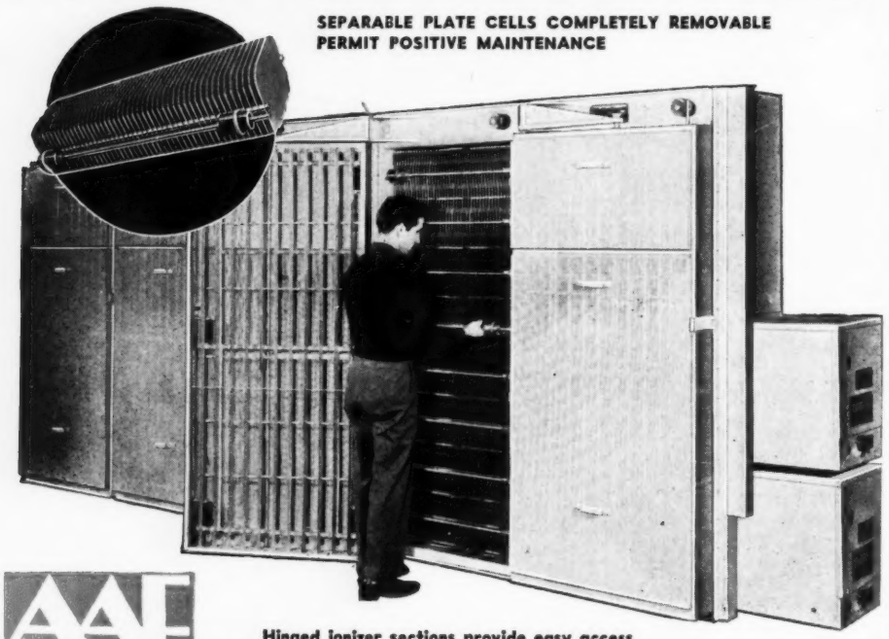
CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

HINGED, FULL HEIGHT IONIZERS

SEPARABLE COLLECTOR PLATES

SECTIONAL CONSTRUCTION

SEPARABLE PLATE CELLS COMPLETELY REMOVABLE PERMIT POSITIVE MAINTENANCE



AAF

Hinged ionizer sections provide easy access to collector plate cells for cleaning.

Electro·CELL

CELL TYPE *Electronic* PRECIPITATOR

The ELECTRO-CELL is an electronic air filter of new and unusual design that offers the advantages of sectional construction, removable collector plates, full-height hinged ionizers and totally enclosed high voltage wiring. These features, exclusive to the ELECTRO-CELL, are developments of major importance because they simplify installation, improve performance, promote safety and offer a choice of maintenance methods.

The ELECTRO-CELL filter is one of three electronic precipitators developed by this company to meet any requirement for super-clean air. Each type has distinctive advantages under certain operating conditions, and is the result of more than ten years of research and experimentation in the field of electronic dust control.

Send for Bulletin 252 which gives the complete story

AMERICAN AIR FILTER COMPANY, INC.
Incorporated
361 Central Avenue, Louisville 8, Kentucky
In Canada: Darling Bros., Ltd., Montreal, P. Q.

nected by a cable to a pendant station suspended from the crane. Providing 5-point, time-delay speed control, it eliminates need for accelerating relays, allowing reduction in size of control panel. Has one handle for each direction of crane motion, and includes emergency stop button. Control Div., General Electric Co., Schenectady.

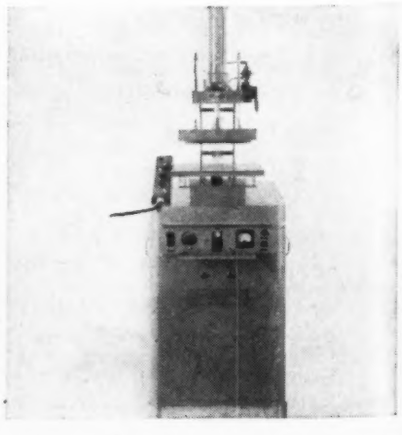
FLASHLIGHT

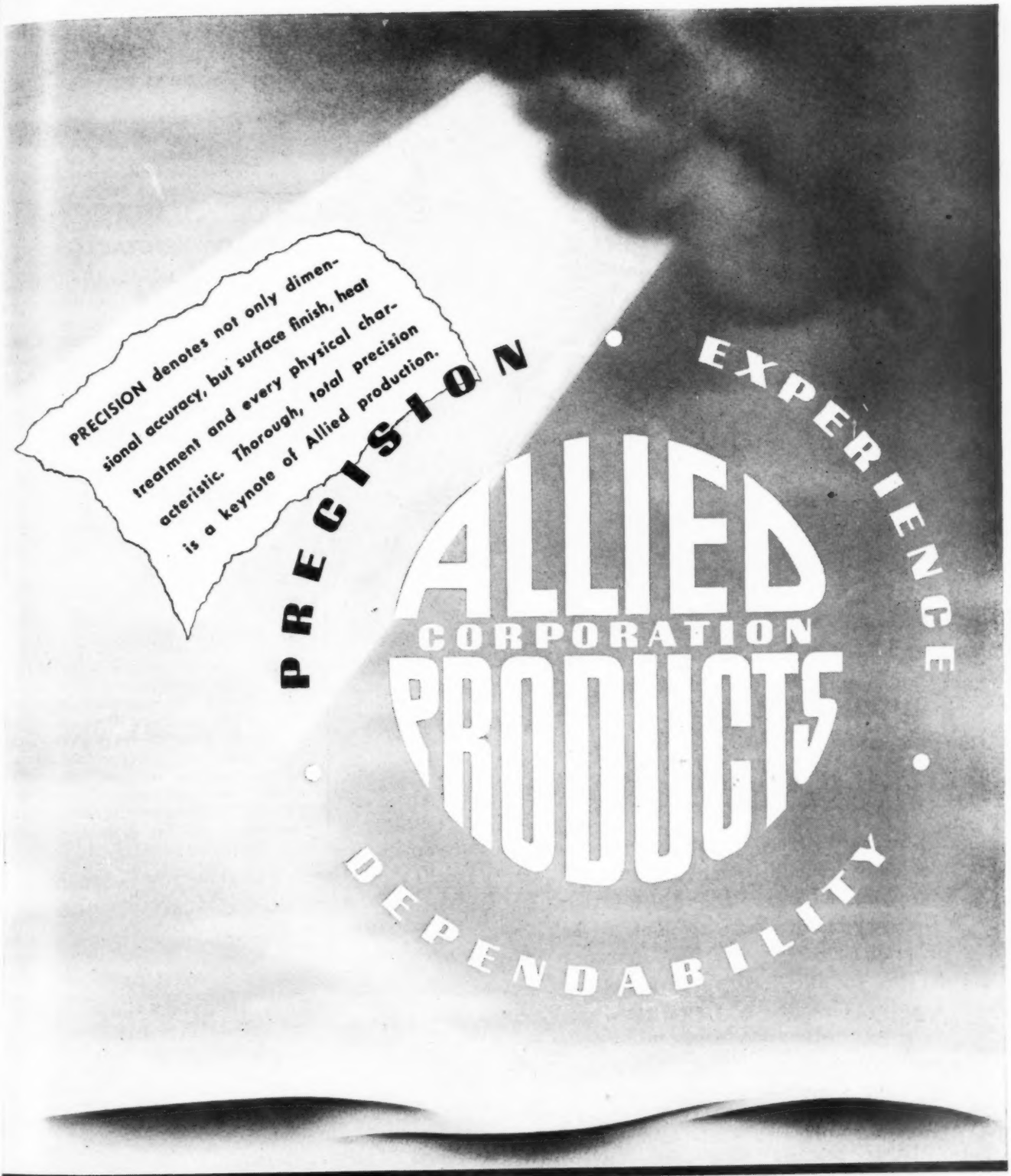
Made of a tough, durable plastic, flashlight case is designed for high impact, tensile, and flexural strength. It can be used around electric and power lines with safety. Except for metal parts, it

resists corrosion of exhausted dry cells, and is unaffected by oils, greases, gasoline, or water. Temperatures from 30 deg. below zero to 150 deg. F. will not cause warping, cracking, or deterioration, according to the manufacturer. The lens is unbreakable, and does not check or discolor with age. All parts are replaceable. Ideal Industries, Inc., 1416 Park Ave., Sycamore, Ill.

THERMOPLASTIC SEALER

Type K-3-S, 2½-kw. dielectric sealer is designed for sealing, bonding, or welding thermoplastic sheets. Applying radio frequency power, it eliminates thread-stitched seams, producing airtight, waterproof seams stronger than the thermoplastic sheets themselves, according to the manufacturer. Sealing press may be mounted on the unit and operated by foot controls. Electrical operation is provided by remote control



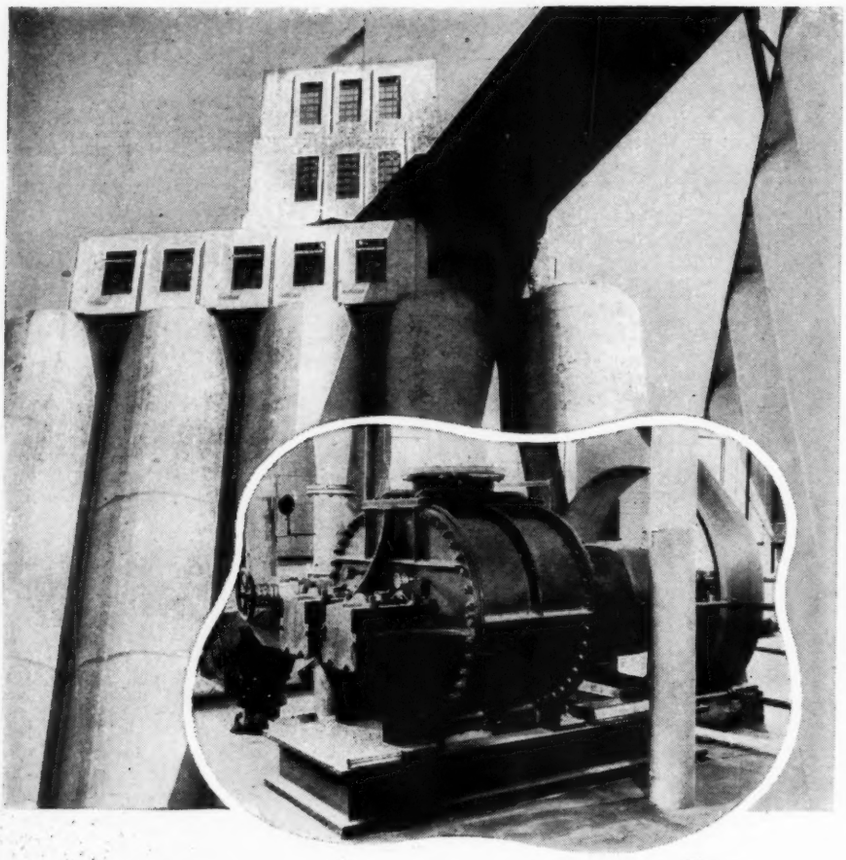

PRECISION denotes not only dimensional accuracy, but surface finish, heat treatment and every physical characteristic. Thorough, total precision is a keynote of Allied production.
PRECISION
EXPERIENCE
ALLIED
CORPORATION
PRODUCTS
DEPENDABILITY

ALLIED PRODUCTS CORPORATION

DEPARTMENT 31

4632 LAWTON AVENUE • DETROIT 8, MICHIGAN

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS
SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS
SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES



A BUSHEL OF OATS EVERY 2 SECONDS *by Air*

Under busy streets, 45,000 bushels of oats flow every 24 hours from this elevator to the mill, seven blocks away, carried on air from Roots-Connersville Blowers. The same blowers do double duty by helping to convey by-products back, from mill to elevator.

This specific job calls for Rotary Positive Blowers. Where Centrifugal units suit better, R-C *dual-ability* can supply them, for we build both—and thus make our recommendations without prejudice.

For moving air or gas in small or large quantities, you can count on R-C *dual-ability*.

ROOTS-CONNERSVILLE BLOWER CORPORATION
One of the Dresser Industries
612 Central Avenue, Connersville, Indiana

Roots CONNERSVILLE SINCE 1854

BLOWERS FOR EVERY NEED

ROTARY POSITIVE AND CENTRIFUGAL BLOWERS • EXHAUSTERS • BOOSTERS
LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

box. Straight or shaped bar electrodes make possible a range of seams for sheets of different lengths, and thicknesses from .002 to .040 inch. Includes radial-fin, air-cooled tubes, large casters, safety interlocks, pushbuttons, overload relays and circuit breaker, connecting terminals, and calibrated dial. Thermatron Div., Radio Receptor Co., Inc., 251 West 19 St., New York 11.

HEADREST SPECTACLE

Suitable for worker's protection in low temperature brazing operations, Type L-T-B-50 headrest spectacle is for use where complete eye covering is unnecessary. Takes 50-mm. lens shades Nos. 3 and 6. Of all-plastic light but

rugged construction, the headrest feature evenly distributes weight of the spectacle over the entire head, relieving pressure on nose and face. All-round ventilation prevents fogging and provides maximum visibility. Welder can lift spectacle to "up" position for inspecting work or equipment, and with a flip of the finger reset spectacle in an "on guard" position. Jackson Products, 3265 Wight St., Detroit 7.

ALUMINUM ALLOY WHEEL

Line of rubber-tired wheels, from 4- to 16-in. diameter, is made of lightweight aluminum alloy with maximum strength. Resistant to corrosion or rust, the alloy cast wheel is fitted with pneumatic, cushion, or molded-on rubber tires. Made in sizes for hand truck and caster use, as well as a range of wheelbarrow sizes, with either the pneumatic or zero pressure rubber tire. Hutton Wheel Corp., 2110 Walnut St., St. Louis 3.

PORTABLE RECTIFIER

Model 725S1C rectifier, a complete d.c. power supply source with a capacity of 150 watts, is a lightweight portable unit. Output is adjustable from zero to 6 volts, and it has a continuous capacity of 25 amperes. Featuring single-phase full wave circuit, using a quadruple protected selenium rectifier element, the unit is convection cooled, has no moving parts, and operates noiselessly. Heavy-duty rubber cord and plug match any standard a.c. outlet, and "on-off" switch

ANNOUNCING THE NEW

No. 112-M

HYDRAULIC INTERNAL GRINDER

FOR LONG WORK

The new No. 112-M Bryant Internal Grinder is designed to precision grind bores up to 9 inches in depth in extra-long, hard-to-chuck parts. Work, such as a machine tool spindle, a long arbor, or a shaft, is supported rigidly, either in a hollow work spindle and steady rest, or by a special fixture that allows the work to run in its own bearings. And, the 112-M offers flexibility that is particularly valuable where production schedules require frequent set-up changes. Adequate longitudinal and swiveling adjustments are provided for grinding tapers up to 30 degrees and reverse tapers up to 10 degrees. A hydraulic retracting mechanism for the wheel slide facilitates loading and gaging long parts, while conveniently located controls simplify operation and set-up. Complete details, capacities and dimensions are contained in the new catalog sheet and will be sent on request — or better still, if you have any work or problems that involve internal grinding—

Send for the man from Bryant.

BRYANT

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

"Take it away" with

CM HERC-ALLOY

SLING CHAIN

Every Inswell electric-welded link in this CM Herc-Alloy steel chain personifies safety and lifting strength. From the white hot ingots in the nation's steel mills to the finished structural girders for our skyscrapers, CM Herc-Alloy Sling Chains have been doing a handling job that ranks them "tops" in industry... "tops" in dollar value, service life, maximum safety or any other yardstick of measuring.

Ask your mill supply distributor about the particular CM Herc-Alloy Sling Chain for your job and learn first hand the reasons why the top names in American industry have been using them for years.

HERC-ALLOY LINK SHOWING PATENTED INSWELL WELD

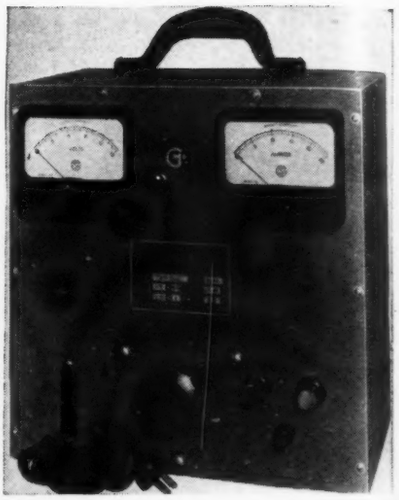
COLUMBUS-McKINNON

CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corporation)

GENERAL OFFICES AND FACTORIES: 130 Fremont Ave., TONAWANDA, N. Y.

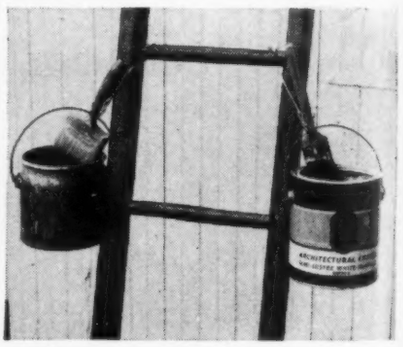
SALES OFFICES: New York, Chicago and Cleveland



of magnet circuit breaker type provides input protection. Panel mounted fuse in d.c. circuit provides output protection. Unit has a continuous range voltage control transformer, from zero to maximum. W. Green Electric Co., Inc., 130 Cedar St., New York.

PAINT POT HOOK

The 5-Way Hook has a spring clamp to hold brushes not in use. If large and small brushes are being used on the same job, the hook suspends the second brush in the can until needed. The spring clamp also serves to hold brushes overnight in oil or turpentine. The hook works on stepladders, either to hold paint cans or, in pairs, as hangers for



screens, signs, doors, and storm sashes, supporting them at a convenient height for painting, washing, or repairing. Hooking on either side of a ladder, it holds the paint can firmly against the ladder on either side. Requires no screwing, clamping, or twisting. E & J Enterprises, 39 Grove Ave., Verona, N. J.

DISPLACEMENT PUMP

Gearex rotary pump is of the positive displacement type, and comes in internal-bearing models for lubricating fluids, and external-bearing models for non-lubricating fluids. It is a medium duty pump available in capacities from 1 to 550 g.p.m. Discharge pressures up to 250 p.s.i. can be maintained with liquids, such as water and solvents. The non-

None Finer!

BLACK

The modern packaged line of Gas Cutting & Welding Apparatus

"SEE YOUR JOBBER"

The Black Manufacturing Company

1423 WEST BALTIMORE STREET • BALTIMORE 23, MARYLAND

FORMERLY THE ALEXANDER MILBURN CO. PIONEERS IN GAS CUTTING AND WELDING APPARATUS SINCE 1907

Unit-Built ... RCA MASTER SOUND CONTROL CONSOLES

A Master Sound Control Console provides paging facilities to loudspeakers in 15 to 60 zones.

B Master Sound Control Console with Record-Transcription Unit and facilities for the distribution of speech and music to loudspeakers in 120 zones.

C Master Sound Control Console with two Record-Transcription Units, a Radio Receiver and paging facilities for distribution to 120 zones.

Whether your problem is sound distribution for a small paging installation or an elaborate plant broadcasting service—you can do it better with an RCA unit-built Master Sound Control Console.

A series of standardized frames and panels are matched to make up distinctly styled basic units. These matched units are so designed that it is possible to assemble them into any desired combination of unit-built Master Sound Control Consoles.

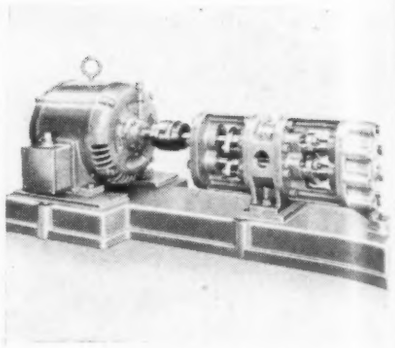
No matter what your requirements—record-transcription turntable, recorder, radio, or paging—the right combination of basic units can be provided to give you any or all of these services. As your needs develop, basic units can be added without discarding equipment already in use.

Built of "matched" units RCA's Master Sound Control Equipment provides custom-built consoles within the price range of regular production-made equipment.

For full information on the various *unit-built* combinations, write Dept. 32-L, Sound Equipment Section, RCA, Camden, N. J.

SOUND SYSTEMS
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal



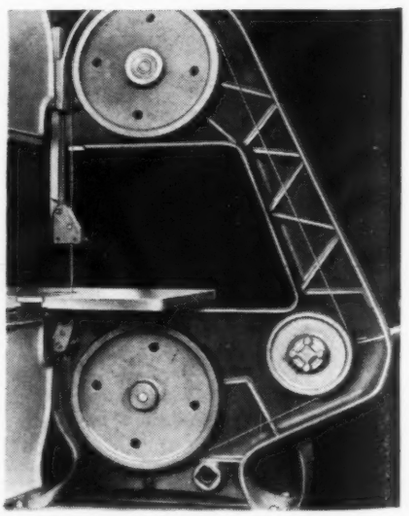
contacting rotors are deep-toothed and small in diameter, to provide low pitch line speeds even at high r.p.m. Includes direct connection by flexible coupling. Deep stuffing boxes are standard equipment. Either vertical or horizontal mounting may be obtained. Sier-Bath Gear & Pump Co., 9263 Hudson Blvd., North Bergen, N. J.

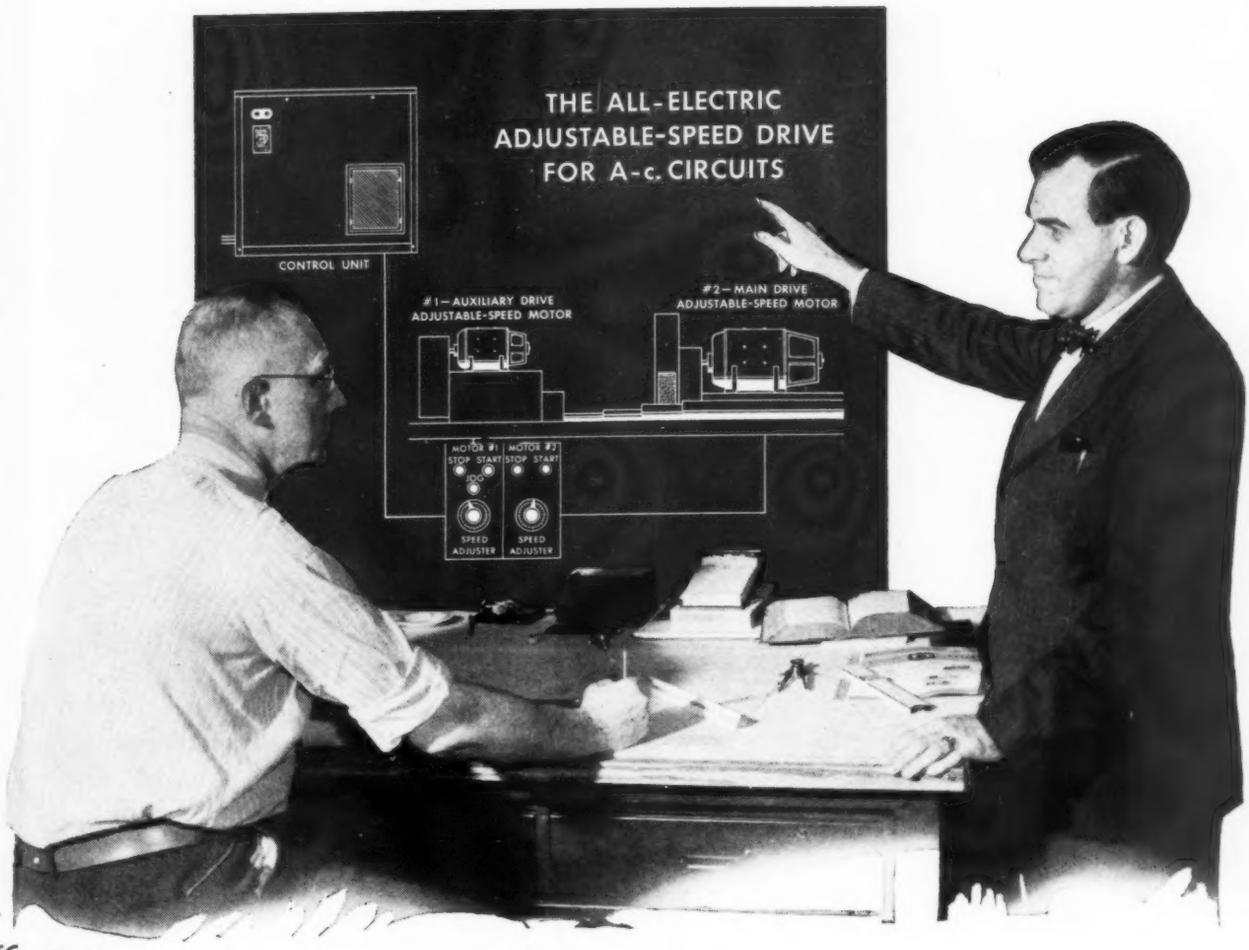
DISC CEMENT

Compounded for applying cloth-backed and flexible paper discs to steel disc-grinding machines, Master disc cement is claimed to be easy to apply and remove, in addition to having strong adhesive powers. It is not designed for heavy fiber-backed discs. Only a few minutes are required for removing worn discs and applying new ones with the cement. Furnished in quart cans, it will not deteriorate if the container is kept tightly closed, maker says. The Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11.

BAND SAW

Handling plastic, metal, or wood, band saw features twelve speeds, ranging from 85 to 1750 r.p.m., permitting adjustment to the speed needed for each material. Safety is provided by main frame and table, which separate the operator and the blade. Overall design is said to eliminate the possibility of injury from blade breakage. Strongly





"Here's your Answer

TO UNLIMITED SPEED SELECTION!"

Reliance V★S is the *All-electric, Adjustable-speed Drive,* which operates from *A-c. Circuits.* The flexibility it brings to machine operations can increase your production and cut your costs—as it has already done in thousands of installations. Here is the simplest, most efficient means of securing an infinite range of stepless speed changes from your plant's A-c. circuit for all processing jobs. Bulletin 311 will bring you more of the important facts about the V★S Drive. Write for it today!

RELIANCE V★S DRIVE

Conveniently-packaged, space-saving V★S Drives are available from 1 to 200 horsepower.

RELIANCE ELECTRIC & ENGINEERING CO.

1070 Ivanhoe Road • Cleveland 10, Ohio

Appleton, Wis. • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Denver • Detroit • Gary • Grand Rapids • Greenville Houston • Kansas City • Knoxville • Los Angeles • Milwaukee • Minneapolis • New Orleans • New York • Pittsburgh Portland, Ore. • Rockford • St. Louis • San Francisco • Seattle • Syracuse • Tampa • Tulsa • Washington, D. C. Sao Paulo, Brazil

RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"

Sure Cure for Extension Cord Headaches

APPLETON PORTABLE TYPE

Reelite

TRADE MARK

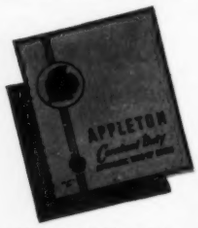
Extension cords that have kinked, been walked on and trucked over until they're frayed and worn can cause damaging shorts. Replacing them constantly is costly.

Extension cord troubles come to an end when Appleton Portable Reelites are installed. They keep cord reeled up and out of the way when not in use. Cord unreels to desired length, against spring tension, and is held by ratchet stop like a window shade.

The Appleton Portable Reelite supplies bright, safe light, exactly where it's needed, in car-loading, stockkeeping, machine-inspection and building-maintenance. Sturdily built . . . lasts a lifetime.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY
1715 Wellington Avenue • Chicago 13, Illinois
14 Branch Offices and 7 Resident Representatives in All Principal Markets



SEND TODAY

for 50-page Bulletin 504, describing Portable Reelites, as well as large heavy-duty types for power lines to moving equipment, and special Reelites for power tools, also air and fluid lines. Or, see Sweet's File, page 2a/19.

FOR HOME USE, TOO!

A marvelous convenience in basements, attics, garages. Provides safe light in dark corners and other out-of-the-way places. Also in drop-cord type for over work benches. (see illustration.)

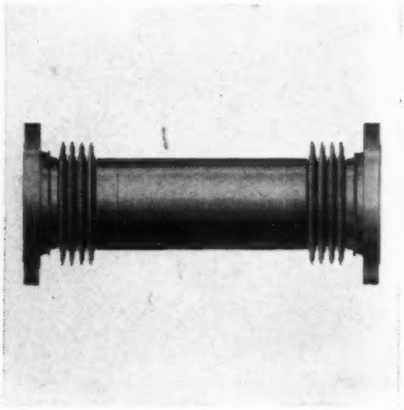
APPLETON

CONDUIT FITTINGS • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

braced frame is of seasoned cast iron alloy, precision machined for close tolerance, and the 20x20-inch table is of Blanchard-ground cast iron alloy. Tilts to 45 degrees, for angle sawing, by half turn of socket-head cap screw. The hardened tool steel guides are adjustable. Furnished with or without ¾-hp., 900-r.p.m. motor. Ermac Co., 5531 South Vermont Ave., Los Angeles 37.

PIPE JOINT

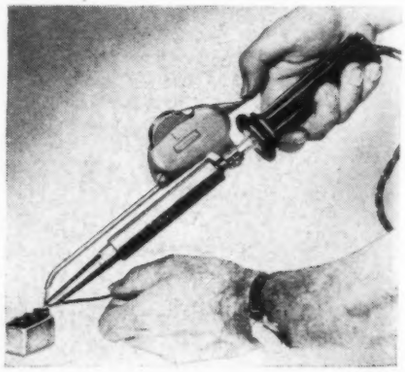
Packless expansion joint, called Offset Joint, is a standard flexible unit for joining pipe terminals which are out of line, or offset. It is constructed with an equal number of expansion flanges on either end of an insert section. Length of unit and number of flanges are determined by misalignment condition to be corrected. The joints are supplied with



bellows flanges for pressures from vacuum to 1000 p.s.i., pipe sizes from ½ to 24 inches, and temperatures from minus 300 to plus 1600 deg. F. Made of stainless steel, monel, inconel, and copper. End fittings are available in welding end or Van Stone bolted flanges. The joint also protects valves, headers, and fittings from undue strain and tension. Magni Lastic Div., Cook Electric Co., 2700 Southport, Chicago 14.

SOLDER DISPENSER

Attached to any standard electric soldering iron by means of an adjustable adapter leaf, Kwikfeed solder dispenser is operated by thumb or finger pressure of the hand holding the iron. It has posi-



In this survey Rack recommended an investment of $15,684 for RACK CONVEYORS to save $107,634 yearly

WHERE is the plant that wouldn't spend $1 to save $7 a year, especially since the original investment quickly pays for itself in the savings that go on *year after year*!

A Rack engineering survey proved this possible in the case of a manufacturer of gears. *Rack* engineers completed a painstaking plant study of methods, time and motion, and recommended certain changes which they proved justifiable.

In handling, moving or processing, the *Rack Method of Controlled Materials Placement* will speed production and cut costs.

Let us prove how you can cut costs . . . no obligation!

We are prepared to make a complete study of your material placement problem, with a time-study of every factor entering into this vital phase of production. No obligation—write us at once.

RACK ENGINEERING CO., Pittsburgh 1, Pa.

New York • Philadelphia • Cleveland • Detroit • St. Louis • Chicago

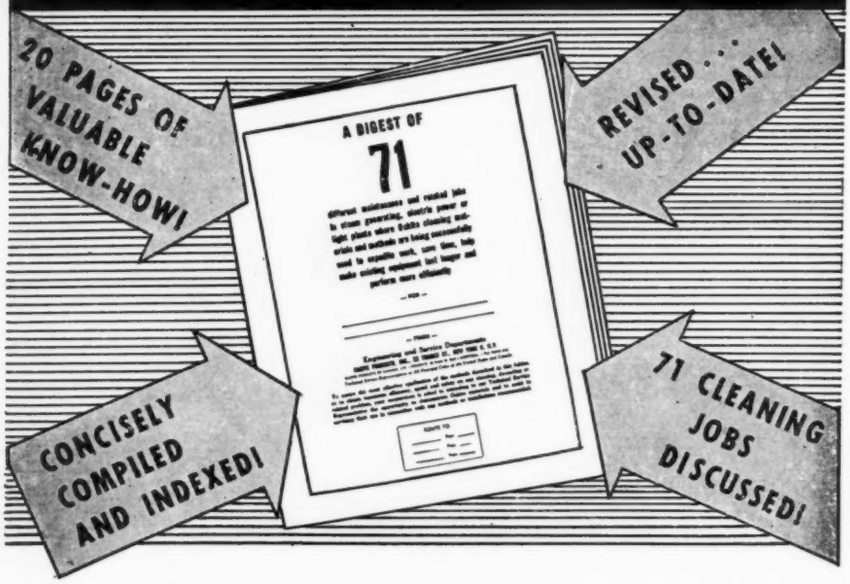
Over 500 Leading Manufacturers Use

Rack CONVEYOR SYSTEMS

For CONTROLLED MATERIALS PLACEMENT

4.

FREE DIGEST for PLANT ENGINEERS!



Gives Successful Experience of Over 1000 Plants in Expediting Power Plant Maintenance

TYPICAL JOBS WHERE RESULTS ARE IMPROVED . . . COSTS LOWERED

Cleaning surface condensers
Cleaning oil coolers . . .
fuel oil heaters . . .
oil storage tanks
Descaling Diesel engine
water jackets
Washing lamps and reflectors
Cleaning air filter sections
before recoating
Cleaning floors . . . walls . . .
painted surfaces
Washing waste and wiping cloths
Repairing parts
Stripping paint from transformers

You will find this revised, 20-page Oakite Power Plant Digest packed-full of pertinent data and valuable "know-how" for handling cleaning, descaling and related jobs in steam generating, electric power and light plants.

It describes 71 different types of work on which Oakite cleaning materials, techniques and shortcuts are now being successfully used to SAVE TIME . . . shorten equipment down-time . . . expedite repair and overhaul work . . . and eliminate fire and other hazards.

Send for Your FREE Copy NOW!

Upon request we shall be glad to send you your FREE copy of this helpful, informative manual. In writing, please use your business letterhead.

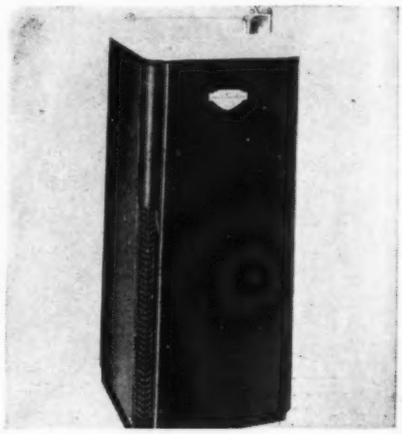
OAKITE PRODUCTS, INC., 14A THAMES STREET, NEW YORK 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized* **CLEANING**
MATERIALS · METHODS · SERVICE · FOR EVERY CLEANING REQUIREMENT

tive ratchet feed, and is constructed of stainless steel. The tube that feeds the solder is adjustable. Eliminating need for holding solder in one hand and iron in the other, the device permits the free hand to adjust the work being soldered. Sound Equipment Corp., 3903 San Fernando Rd., Glendale 4, Calif.

WATER COOLER

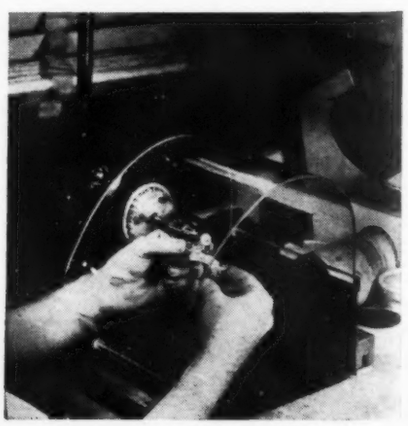
Model K-10 electric water cooler has a rated hourly capacity of 10 gallons. Measuring 15¼x15½x43½ inches, the unit fits into a small area, and operates quietly. Electrical requirements are 110-volt, 50- or 60-cycle, single phase, alternating current only. Includes No. 12000



"angle-stream" type bubbler valve with lever-handle operation. It is self-closing, has automatic stream control, and chrome-plated bubbler guard. Non-squirt, non-clogging, screenless valve has all-brass body with roller bearing operating mechanism and alloy brass forgings. Powered by Polarsphere hermetically sealed condensing unit. The Ebco Mfg. Co., Columbus 8, Ohio.

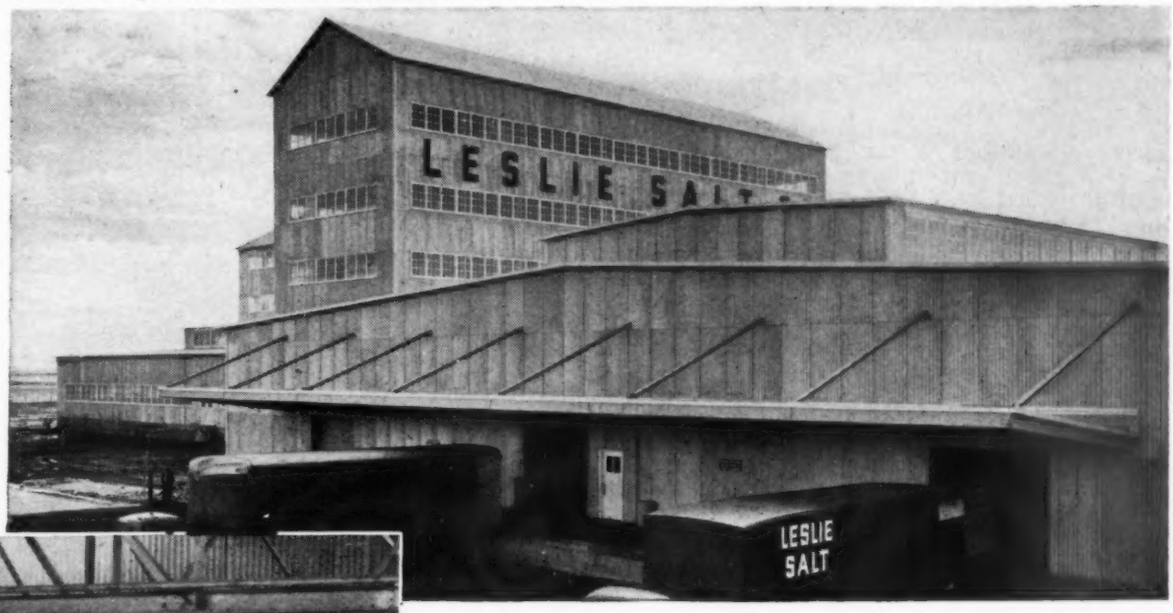
PLASTIC SHIELD

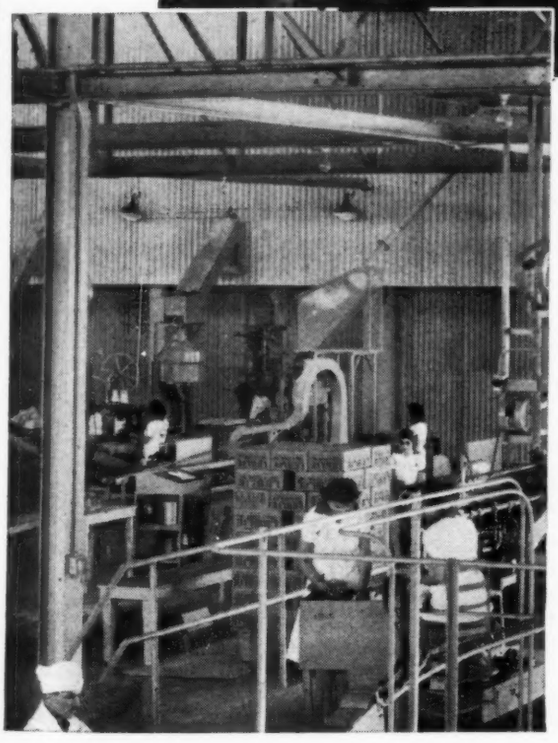
Transparent Plexiglas shield simultaneously protects workers' eyes from flying metal particles and provides for the recovery of the particles, or "sweeps." Permits operator an unobstructed view of his work, and can be cleaned with soap and water. The shatter-resistant



CORRUGATED TRANSITE*... as it serves the Food Industry

*Transite is a registered Johns-Manville trade mark





The all-important Food Industry uses J-M Corrugated Asbestos Transite to simplify and modernize construction. Transite can't rot, rust, or burn . . . needs no upkeep.

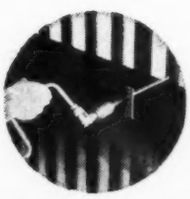
Attractive . . . modern . . . used inside and outside—that's the many-sided job that Johns-Manville Corrugated Asbestos Transite is doing for the Leslie Salt Company of Newark, California. It will be doing that job for a *long, long time* to come.

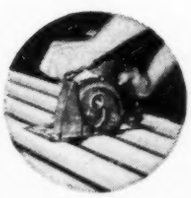
Whatever your industry, whatever type of building, it will pay you to investigate the advantages of this material. Use it for walls and roofs, for new construction or remodeling.

Made of asbestos and cement, practically indestructible materials, Corrugated Transite is fireproof, rotproof, resistant to acids and gaseous fumes. Requiring no preservatives, it is practically maintenance-free. You save on construction costs, too. The rigid Transite sheets, with their unusual strength increased by corrugations, permit a minimum of framing. And if alterations need to be made, Transite is easily dismantled, with 100% salvage.

Write for our illustrated brochure. Johns-Manville, Dept. FM-12, Box 290, New York 16, N. Y.

Because of the unprecedented demand for J-M Building Materials, there may be times when we cannot make immediate delivery. We urge you to anticipate your requirements.


EASY TO BOLT TO STEEL


EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

Johns-Manville *Asbestos* CORRUGATED TRANSITE

NEW
2½ and 5 lb. NOW
REPLACES
2 and 4 lb. sizes
More Fire Fighting Reserve
Less Weight
No Extra Cost

New and larger portables with the original Squeez-Grip valve — the Navy Standard — that made C-O-Two world famous in the fire fighting field. These new portables have more punch, weigh less and have a longer effective discharge. The completely insulated swivel tube and discharge horn is an integral part of the Squeez-Grip valve. Easy to operate — one hand control — squeeze to open, release grip to close. C-O-Two kills flammable liquid and electrical fires in seconds with clean, dry, non-damaging, non-freezing and non-deteriorating carbon dioxide gas. C-O-Two will not harm machinery, equipment, material, fabrics, finishes or food. No after-fire-mess to clean up. C-O-Two is modern fire protection. Now you get additional C-O-Two protection at no extra cost.

C-O-Two is our registered trade mark and corporate name. Be safe, specify C-O-Two when ordering.

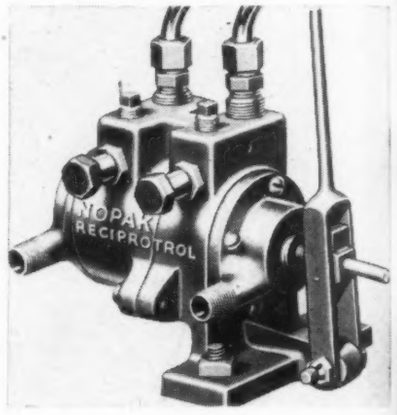
C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY
Sales and Service in the Principal Cities of United States and Canada
AFFILIATED WITH PYRENE MANUFACTURING COMPANY

quality of the plastic combined with its light weight (one-half that of glass) are designed to provide the worker with protection when working with fast-moving machines requiring delicate or precise operation. It is highly resistant to chemicals, and its colorless transparency is permanent. Can be drilled, sawed, cut, or threaded as easily as wood. Dilley Mfg. Co., 1656 Ansel Rd., Cleveland.

FOUR-WAY VALVE

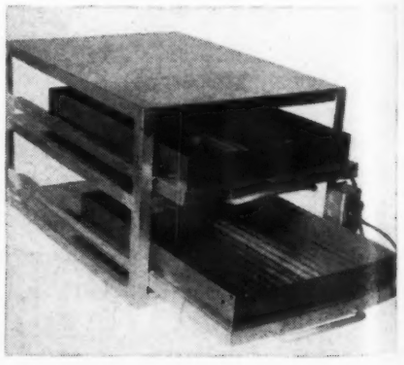
Designated Nopak Reciprotol, 4-way valve operates any size or type of air cylinder at line pressures from 50 to 300 pounds, either air or oil hydraulic. It regulates stroke speed in both directions independently, and permits cycle speeds from 0 to 500 complete cycles per minute, depending on cylinder stroke and di-



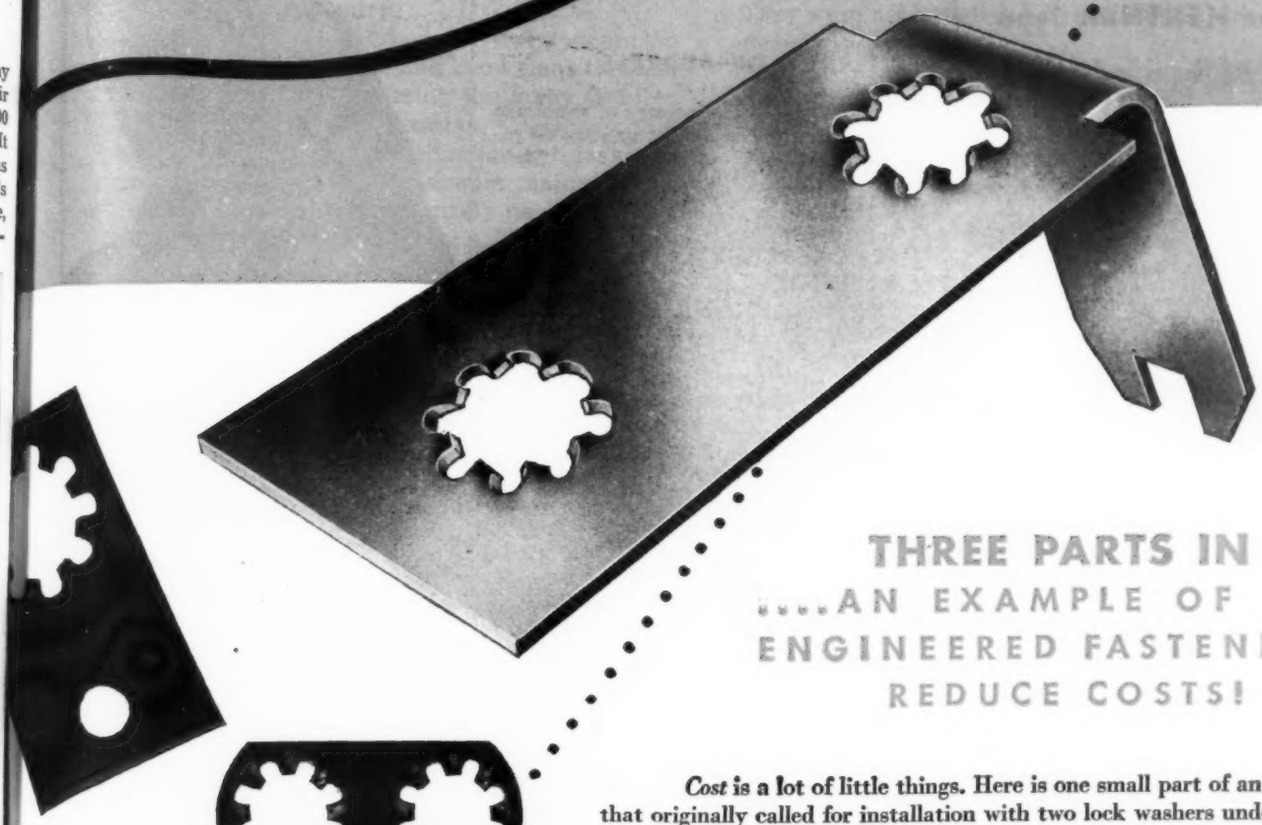
ameter. Built-in controls permit accurate regulation of the stroke-length from the full length of the piston rod to a small fraction. The fractional cylinder stroke may be located at any desired point within the full stroke length. The valve is adaptable to fully automatic, semi-automatic, or manual operation. Galland-Henning Mfg. Co., 2756 South 31 St., Milwaukee 7.

INFRARED PREHEATER

For preheating plastic preforms, dehydrating industrial materials, and drying paints and metal finishes, infrared heater is suitable for applications requiring thermoswitch-controlled low temperatures, with a minimum plus or minus



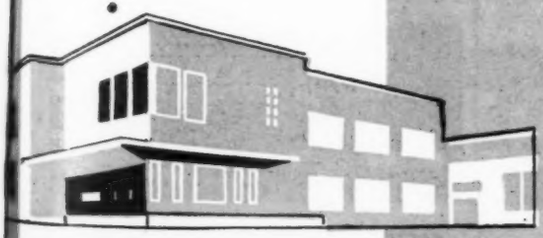
Here's a SHAKEPROOF Cost-Saver!



THREE PARTS IN ONE ....AN EXAMPLE OF HOW ENGINEERED FASTENINGS REDUCE COSTS!

Cost is a lot of little things. Here is one small part of an assembly that originally called for installation with two lock washers under screws. With production calling for thousands of these parts monthly, unit assembly time is important. In addition, the essential lock washer *might* be omitted by a hurried worker. But by calling Shakeproof Inc., the manufacturer obtained an *engineered part* which incorporated the locking feature so necessary . . . eliminated the use of separate lock washers . . . reduced his material cost . . . lowered assembly charges . . . increased the speed of attachment . . . and became absolutely sure of quality control.

If you are planning to use small stamped parts that must be locked tight, where high production and speed of assembly are important factors, it will pay you to investigate the advantages of Shakeproof Engineered Fastenings. Do it today!

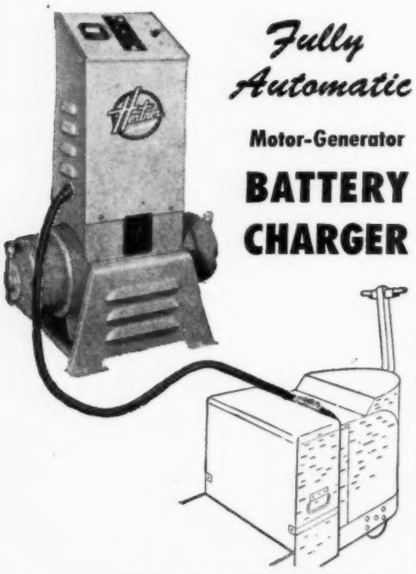


SHAKEPROOF INC.
"Fastening Headquarters"

Division of ILLINOIS TOOL WORKS
2501 North Keeler Avenue, Chicago 39, Illinois
433 South Leiress Ave., Los Angeles 36, Cal. 2895 E. Grand Blvd., Detroit 2, Mich.
Plants at Chicago and Elgin, Illinois. In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

For PEAK PERFORMANCE from your Motorized LIFT-TRUCKS Every Day

use the **HERTNER** Type "H"



Fully Automatic

Motor-Generator

BATTERY CHARGER

FULLY CHARGES LEAD-ACID BATTERIES
in 8 hours
NICKEL-ALKALINE BATTERIES
in 7 hours

Automatic Charging Rate

Amount of charge is governed by completely automatic controls—over-charging is impossible, yet a fully rundown battery can be completely charged in normal charging time.

Automatic Shut-off

Completely automatic controls cut off the charge and shut down the motor-generator when the battery reaches full charge.

Automatic Restart

In the event of power failure, generator shuts off automatically and when power is restored motor-generator automatically restarts and charging is resumed.

"Automatic" Economy

Due to the inherent characteristics of motor-generator design, the Hertner Type "H" charger provides "automatic" economy.

Write for Bulletin 101 describing Type "H" single-battery charger. Hertner Type "H" chargers are also available for charging 2 or more batteries at one time. Write for Bulletin 102.

The HERTNER Electric Co.
A General Precision Equipment Corporation Subsidiary
Motors • Generators • Motor-Generator Sets
12750 Elmwood Avenue, Cleveland 11, Ohio
Representatives in principal cities throughout the world

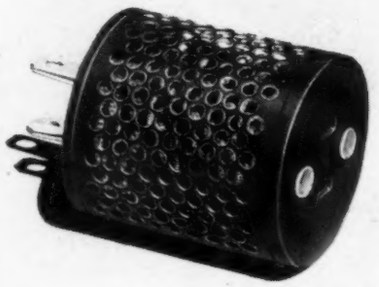
variance up to 380 degrees. Unit is open on all sides to allow released moisture to be dissipated, and drawers are separately removable from two sides. An Infra-Lectric plate, consisting of aluminum-carbon alloy elements fused into tempered glass, forms the bed of the drawer, allowing evenly distributed plate temperatures. Materials may be placed above or below plate, or rest directly on the surface. Delt-Calesco Co., Far Hills, N. J.

CHANGE OF ADDRESS

Roylyn, Inc., manufacturer of couplings, fuel caps, and strainers, announces removal to 718 West Wilson Ave., Glendale 3, Calif.

FLUORESCENT LAMP RESISTORS

Bulletin 26 fluorescent lamp resistors of the plug-in type are for use with single lamp portable fixtures for operation of 20-watt, T-12, 24-in. fluorescent lamps on d.c. The wire-bound fixed resistor is mounted in a small perforated



metal enclosure with spring pressure prongs on one end and a receptacle on the other. Operating as an adapter unit, the resistor is plugged in between the lamp fixture and the d.c. outlet. Requires no wiring and is connected in series with the auxiliary d.c. ballast, serving to limit the lamp current. Ward Leonard Electric Co., Mt. Vernon, N. Y.

BENCH SAW

Adjustable to six positions, bench saw can be used for straight and bevel cut-off, straight and bevel rip, miter and compound miter, sawing, as well as for planing, sanding, routing, tongue-and-groove cutting, and other jobs. Cuts material 3 inches thick, and up to 15 inches wide. Power is supplied by a 1-hp. motor mounted in the frame. A flexible shaft drives the saw, eliminating motor interference. Loosening two nuts permits knocking saw down for transport, and where electricity is inaccessible it can be driven by any available

WHERE PRODUCTION COUNTS

Use Chicago Rawhide

HAMMERS and MALLETS

C/R hammers have malleable iron heads with replaceable coiled rawhide faces.

When hammers and mallets must take stern punishment in long, hard service...when they must give forceful blows with maximum protection to fine finishes and expensive machined parts... it will pay you to insist on *Chicago Rawhide.* Made from tough, resilient, carefully selected hides, C/R hammers and mallets won't crumble, split, mushroom or erase, and they hold their true striking surfaces. Rawhide protects ... Chicago Rawhide protects most.

CHICAGO Rawhide MFG. CO.

1213 ELSTON AVE. • CHICAGO 22, ILLINOIS

EASIEST OF ALL SHEARS TO OPERATE

"EASIEST of all Shears to operate" are not just our words. They are words of operators being heard with increasing frequency as more Steelweld Shears are placed in plants throughout the country.

Men who have worked for many years on shears of various makes and know them through and through are acclaiming the many features incorporated into Steelwelds — features that ease their work, speed production and make for greater accuracy and minimum maintenance.

Steelweld Shears are entirely new machines designed from scratch as such. They are not a variation of or an adaptation to any previously existing machine. The designers of these new shears were free to incorporate all ideas and features that would result in better machines. They were not hampered by tradition or previous designs or models.

As a result Steelweld Shears are radically different with advantages never before possible.

Whether or not you are in need of a shear at this time, if you work plate in any thickness up to 1¼-inch or length to 18 feet, we urge you to get more data on these modern machines. Keep informed — send for the catalog below.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

1157 EAST 283RD ST. WICKLIFFE, OHIO.

STEELWELD PIVOTED BLADE SHEARS

Fire Resistive DESTRUCTION That is!*

That's no joke son. Iron and steel do not make a building "fireproof," a term reasonably applied to buildings constructed of steel, brick, concrete, or other noncombustible materials. For a structure is only as "fireproof" as are its contents, and a blazing interior fire would quickly reduce that structure to a shambles of twisted steel and broken concrete.

This picture of destruction is not a pleasant one—nor a needed one. For with ever watchful "Automatic" Sprinkler Protection, fire just doesn't have a chance to make headway . . . it's stopped at its origin . . . damage is held to a minimum.

—a famous member of the "Automatic" Sprinkler Family. Provides adequate protection for quench tank, transformer, oil line and other fires of flammable liquid origin.

Loss of life by fire or cessation of manufacturing and selling operations because of fire is inexcusable. Such losses are needless and incalculable. 24-hour a day fire protection for every business is a must.

Call upon an "Automatic" Sprinkler engineer for assistance on any fire protection problem. He can even show you how savings will pay for installations.

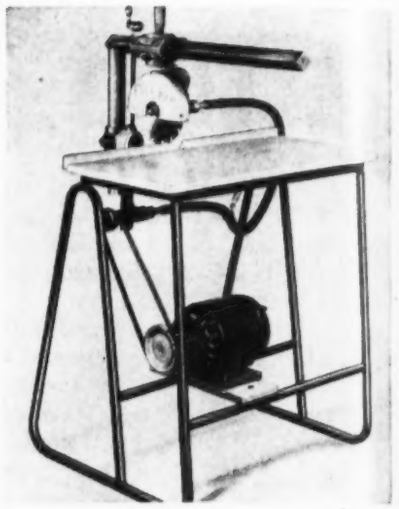
* With apologies to Senator Claghorn

"Automatic" Sprinkler

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

YOUNGSTOWN, OHIO . . . . . OFFICES IN 37 CITIES

"Automatic" Sprinkler designs, manufactures and installs a complete line of fire protection devices and systems for all types of fire hazards. Listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual Laboratories



source of power, such as concrete mixer, tractor, or rear wheel of a car. Flexsaw Mfg. Co., 119 Grindstone Rd., Port Austin, Mich.

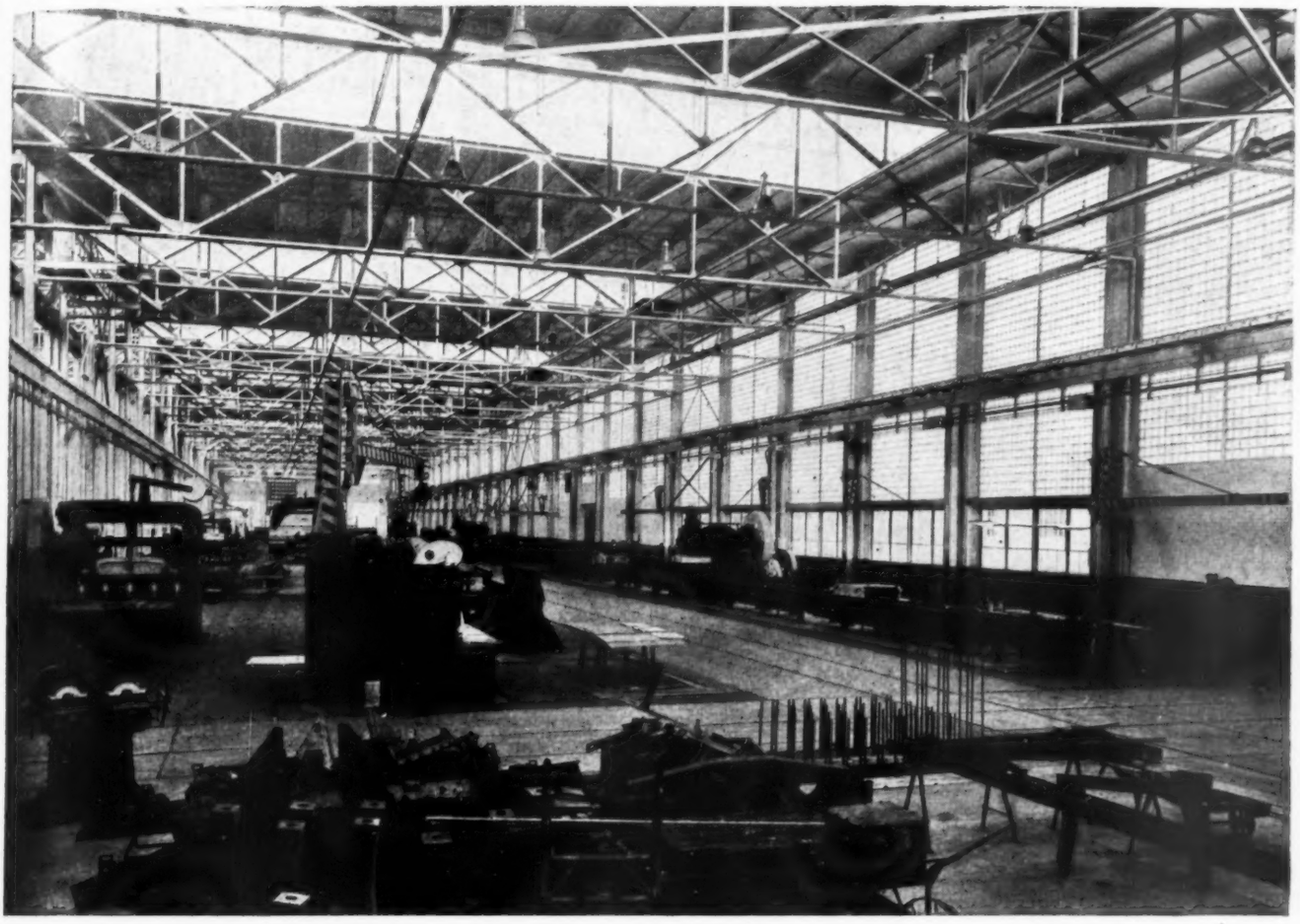
HEAT FAN

Electric heat fan that warms in winter and circulates cooling air in the summer utilizes the forced-air principle. Known as Master Duty Heat Fan, it is available with thermostatic control or with rotary range type, 4-position

switch. Other specifications include: 230-volt polarity type plug; 8-ft. heavy-duty asbestos rayon cord; 4-pole induction type motor; 3000-, 4000-, or 5000-watt capacity; and a thermostat that automatically breaks the circuit if an object prevents delivery of air to the heater. Thermador Electrical Mfg. Co., 5119 District Blvd., Los Angeles 22.

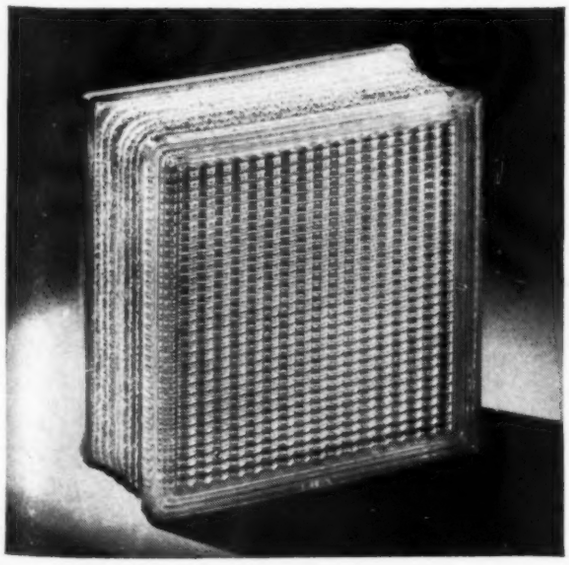
BARREL STAND

All-welded metal stand for 55-gal. barrels facilitates dispensing of liquid contents. The stand consists of a 2-in. steel pipe frame attached to an angle iron base by hinge pins, which permit tilting the frame in either direction. Frame is equipped with a cradle arrangement in which the barrel is held by a notched



It's a giant job to daylight the Northern Pacific Railway Company's big new shops at Brainerd, Minn. An old hand at these big jobs and no "Johnny-come-lately" to railroading, Insulux Glass Block was a natural choice. Ceiling-high Insulux panels distribute daylight evenly across the wide work area. Note the absence of shadows.

The "high ball" is up for Insulux



Insulux Glass Block is a functional building material designed to do many things other materials cannot do. Investigate!

Many railroads and a wide range of other businesses have given the go-ahead signal to Insulux Glass Block.

Insulux panels are quickly and easily installed in almost any building, old or new. The panels resist moisture and even corrosive fumes—thus cutting maintenance expense in buildings where severe conditions are the rule. Insulux cannot rot or rust.

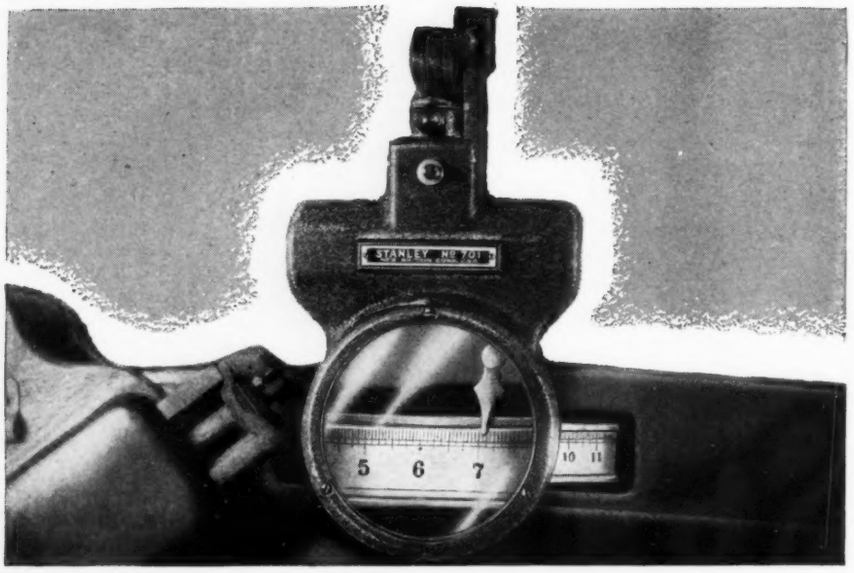
High insulating value of the block means less heat loss—lower fuel bills. Cleaning is simple, or they serve well without cleaning.

When your business plans modernization or expansion, check the many advantages of Insulux Glass Block. For details, write Dept. C-55, Owens-Illinois Glass Company, Insulux Products Division, Toledo 1, Ohio.

OWENS-ILLINOIS

INSULUX

GLASS BLOCK



FAST FIGURE READING

WITH STANLEY "Flud-Lite" MAGNIFIER SPEEDS PRODUCTION

Instant, accurate readings of scales and dial indicators are easy with STANLEY "Flud-Lite" MAGNIFIERS . . . the magnifier that *carries its own light.* They also speed up inspection of machine parts, dies and similar operations as well as promote more accurate line assembly.

You get *better* work *faster* with this combination of a shadow-free fluorescent floodlight and big 5-inch, non-distorting magnifying lens.

Available in models for either portable or permanent installation. Write for illustrated folder. Stanley Electric Tools, New Britain, Connecticut.

STANLEY

Trade Mark

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

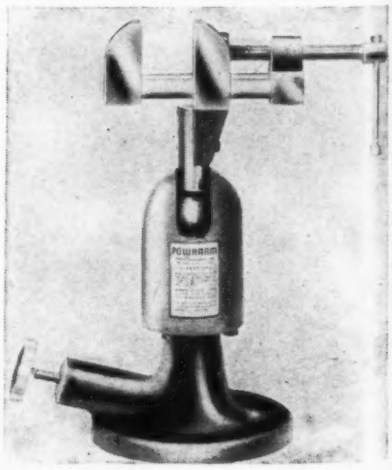
binder. The cradle can be rotated by means of a lever on the outside of one leg of the frame, so the barrel can be locked in either a vertical or horizontal position, or rotated by the cradle lever. The arrangement is designed to allow one man to place a full barrel in the stand. Western Machine Wks., Bruni, Texas.

VALVES

Available in needle and globe types, in sizes up to 1 inch, and in both angle and offset designs, valves are small and compact because of their forged brass bodies. Variations in threading permit direct connection to either pipe or flexible tube systems without extra nipples or adapters. Tubing is accommodated in a range from ¼- to 1-in. o.d. pipe from ⅛ to 1 inch. Reduction in pressure drop is effected by elimination of pockets, angle ports, and unnecessary chambers. The shut-off valves are of the non-rising stem type, and the disc and stem extension are of full hexagon form. Parker Appliance Co., 17325 Euclid Ave., Cleveland.

WORK POSITIONER

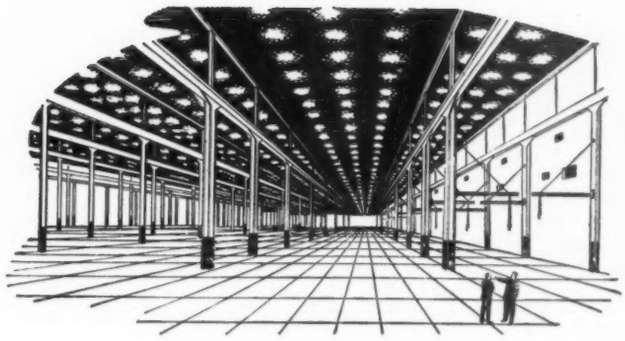
The Powrarm Universal Positioner holds and positions benchwork for production, assembly, service, and maintenance operations, permitting operator to work with both hands free. Affording access



The Greatest Forward Step in Carrier History

★

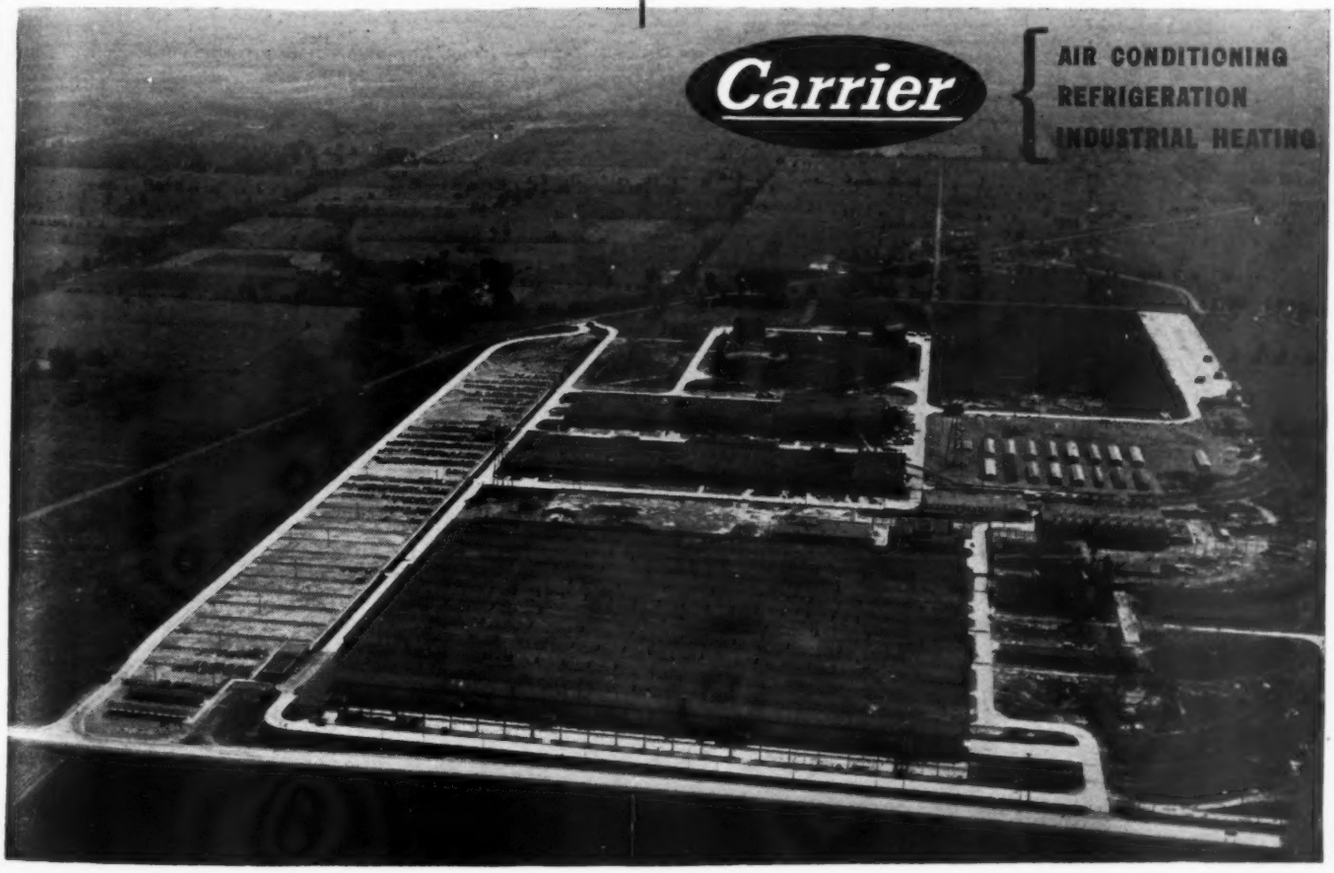
660,000 sq. ft. more to build Carrier Air Conditioning and Refrigeration

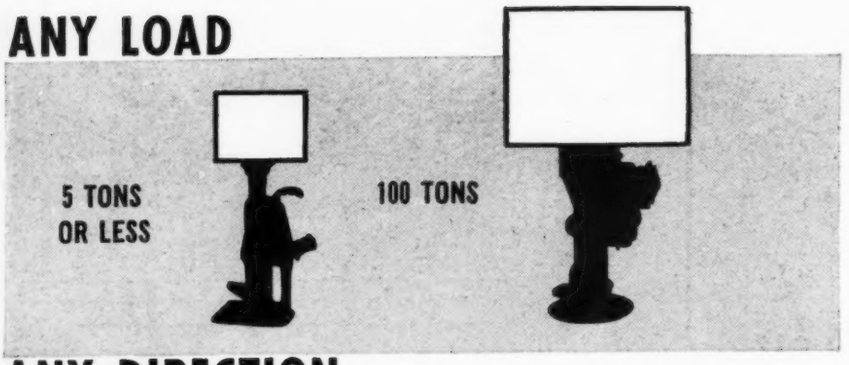


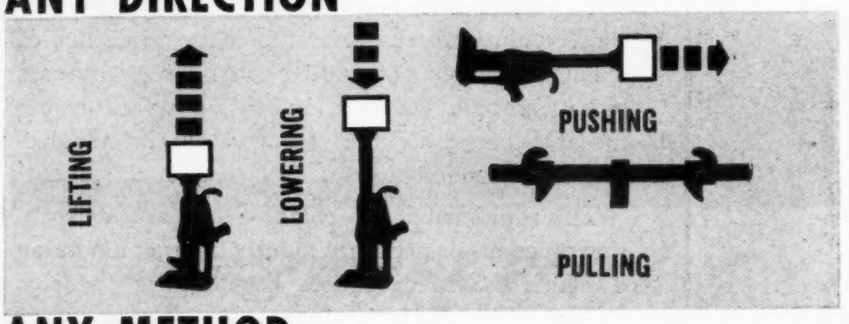
Today, more than ever before, Carrier leads in air conditioning and refrigeration. For the acquisition of a huge, new 660,000-sq.-ft. plant in East Syracuse gives Carrier Corporation facilities that are among the largest, most modern in the world for the manufacture of air conditioning and refrigeration equipment!

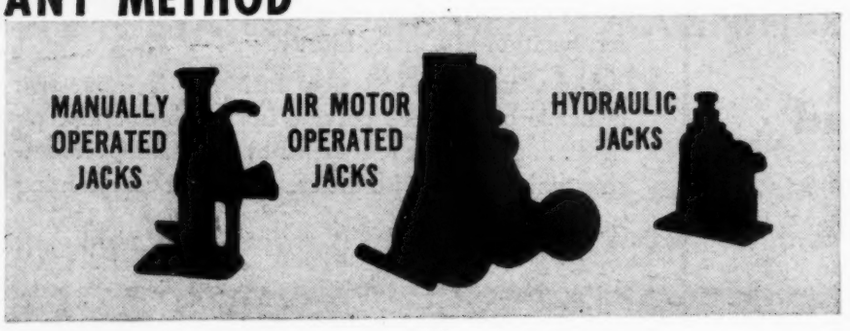
This additional plant—part of Carrier's great expansion program—is necessary to meet the ever-mounting demand for Carrier products. Together with the large plant in Syracuse, it will in a matter of months produce the greatest volume of air conditioning and refrigeration in Carrier history.

Here, in these vast new facilities, is impressive evidence of Carrier's position in the air-conditioning field . . . a dramatic re-statement of the Carrier leadership which began with the creation of air conditioning 44 years ago.







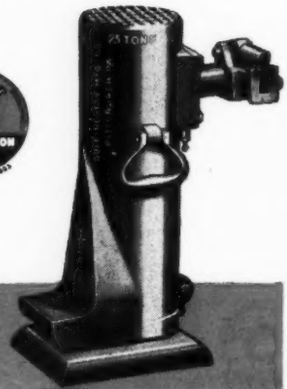


There's a wide range of

Duff-Norton Jacks

to meet YOUR requirements

No matter what the job may be, there is a Duff-Norton Jack to supply the "mechanical muscles." From the wide Duff-Norton line, you'll find Jacks of all types, sizes and capacities —each one easy to operate, safe and dependable. Check your industrial distributor today. Descriptive bulletin on request.



THE DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PA.
Canadian Plant: COATICOOK, QUEBEC

There is a distributor near you

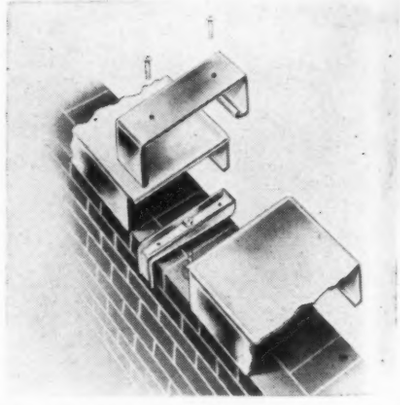
to all sides, the unit holds light or heavy work, and permits turning 360 degrees at any angle or horizontal or axial planes, and 180 degrees on vertical planes by fingertip adjustment of pressure control knob. Produced in hydraulic and mechanical models. Universal attachments available with the unit permit mounting carburetors, distributors, generators, magnetos, castings, machined parts, vise work, and other items. Garfield Eng. Corp., Kansas City.

WATER CLARIFIER

Liquon Sludge Contact Reactor combines the operations of mixing raw water with the coagulating chemicals, maintaining a suspended deep sludge bed or blanket of previously accumulated precipitates, separating the clarified water from the sludge, and concentrating the impurity-saturated sludge for minimum volume of blowoff. Units range in capacity from 250 g.p.h. up to 10 million g.p.d. Cylindrical in shape, the small sizes are made of steel, and the large of concrete. Turbidity is said to average not more than 10 parts per million in the effluent from the reactor. Liquid Conditioning Corp., 423 West 126 St., New York 27.

METAL COPING

Prefabricated metal coping, designated Goodwin Lifetime, can be quickly assembled and installed, is light in weight, needs no caulking or re-sealing, and requires no special tools for erection. Four



pieces of metal form the basic parts, and any fitting that is necessary can be made during installation. Construction forms a tight joint with room for expansion and contraction. Extruded metal gutter bar disposes of any water that might seep beneath the seam. Units are made of corrosion-resistant metals. Overly Mfg. Co., Greensburg, Pa.

ELECTRIC HAND TOOL

Type 40 electric hand tool and portable grinder has ⅕-hp. motor, and speeds to 40,000 r.p.m. Can be used for grinding, milling, drilling, finishing and polishing

"It's Just Plain Horse-Sense

. . . applied to rising maintenance, sir!"

A SOUND DECISION today on the selection of valves will effect great savings tomorrow in maintenance expense, which is rising steadily along with mounting wage levels and material costs.

The average plant has many thousands of valves. The cost of maintaining these valves in good repair may well exceed their total original cost – *if they are inferior valves.* However this same maintenance cost can be held to an almost negligible minimum – *if they are good dependable valves.* That's why it's just plain horse-sense to install the best, most dependable valves . . . Jenkins Valves!

With Jenkins Valves you can be assured of the most reliable operation at the lowest cost – not just for a few months, but for many years to come – for Jenkins superior craftsmanship, quality of materials, and design make them famous for long, trouble-free service.

Millions of Jenkins Valves now in operation prove this – yet you pay no premium for this extra value. *Sold Through Reliable Industrial Distributors Everywhere.* Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; San Francisco; Chicago. Jenkins Bros., Ltd., Montreal, Canada; London, England.

LOOK FOR THIS TRADE JENKINS MARK DIAMOND MARK

SINCE Jenkins Bros 1864

JENKINS VALVES

Types, Sizes, Pressures, Metals for Every Need

POPULAR!

because it's... portable-practical-profitable

WELLS NO. 8

USERS like Wells Metal Cutting Band Saws for a number of very good reasons. In the first place these saws, though rugged in design and construction, are compact, self-contained, and readily portable. You can move them to a point most convenient to the work. They take up little floor space. Wells saws are also 100% practical—simple to operate, yet capable of handling a wide variety of work without special fixtures. A third important reason for widespread popularity, is that thousands of users have found them highly profitable. For a small investment, you get a versatile tool that can help you in many ways...in breaking bottlenecks...in getting work out in less time. See your local Wells distributor, or write for details.

Specifications

CAPACITY: Rectangular 8" x 16"
(Special Guides) . . 5" x 24"
ROUNDS: . . . 8" Diameter
MOTOR: . . . ½ H. P., A. C. or D. C.
SPEEDS: Selective 60, 90, 130 ft. per min.
WEIGHT: . Approximately 665 pounds

Wells SAWS

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1414 TAYLOR ST., THREE RIVERS, MICHIGAN

metals, plastics, glass, and for special operations. Cased in high-impact plastic, it weighs 40 ounces. Features include a large rigid precision quill fitted with # 0 Morse taper for interchangeable mounting of collet chucks for rotary cutters and millers, a Jacob's chuck for small or special arbors for unmounted grinding wheels and diameter drills, and abrasives. Cooling is effected by aerodynamic fan mounted on motor shaft, which also blows away dust and chips. Precise Products Co., 1328-30 Clark St., Racine, Wis.

CIRCUIT BREAKER

MO-4 Multibreaker has been designed for the protection of 4 single-phase circuits or less, of 10, 20, and 30 amperes. Has both automatic overcurrent and short-circuit protection for branch cir-

cuits, and is in the form of a circuit breaker with combined thermal and magnetic characteristics for maximum speed in tripping. The Trumbull Electric Mfg. Co., Plainville, Conn.

COOLING, CONDENSING RADIATORS

Cooling and condensing radiators, known as VAD units, having capacities for a water cooling unit ranging upward from 3,600,000 B.t.u./hr. at standard conditions. The cooling faces are located on two opposite sides of the unit to permit line installation of several units where very large capacites are required. Available for water cooling, oil cooling, steam and vapor condensing,

Interested in Adding 50% to Cutter Life?

Because it is a radically different kind of cutting fluid . . . a chemical emulsion which combines cooling capacity and friction reduction in a degree never before attained . . . Cimcool has produced amazing increases in tool life in plant after plant. May we demonstrate what it will do in YOUR plant?

Other CIMCOOL *Advantages*

- Uniform work temperature increases accuracy.
- No fire hazard—No smoke—No slippery film.
- Faster cooling allows faster cutting.
- Non-irritating—Doesn't grow rancid.
- Covers 85% of all metal working jobs.
- Contains long-lasting rust inhibitor.

Cutter life increased at least 50% says Thompson Industries, Inc. of Long Island City, N. Y.

Here's what the company writes about Cimcool: "In our grinding operation, our wheels do not load up so rapidly, thereby increasing wheel life and giving a better finish on the work. Also, in our hobbing machines, cutter life has been increased at least 50% between sharpening."

CIMCOOL DIVISION OF
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

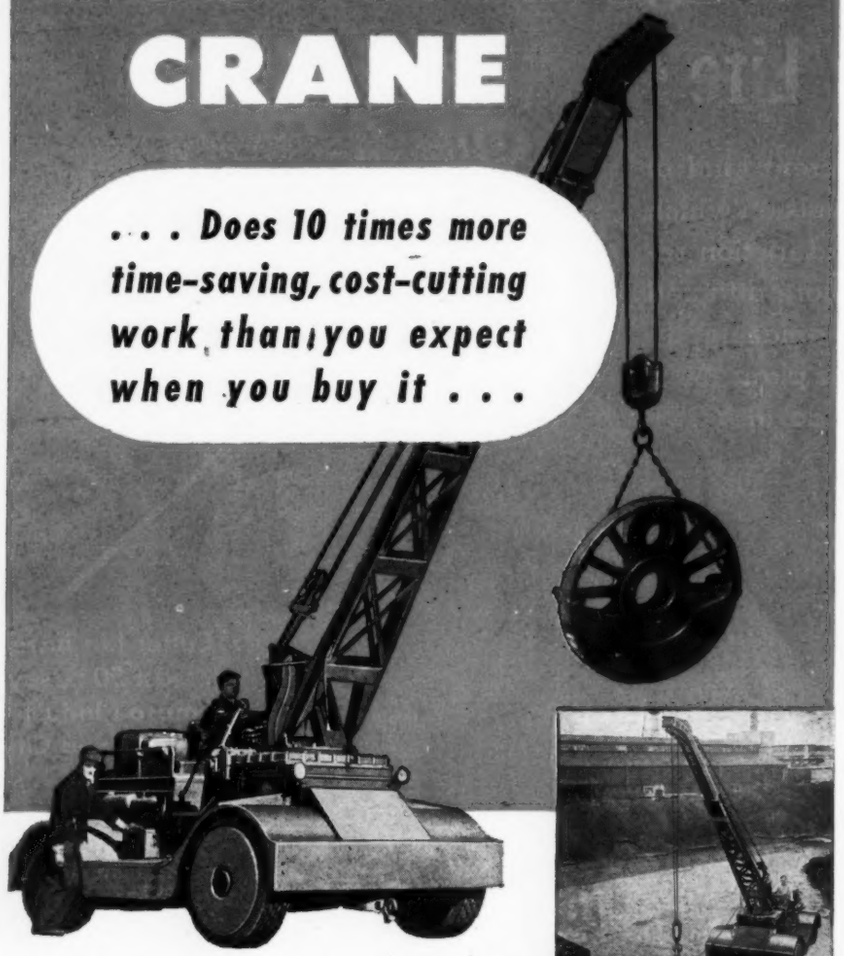
CIMCOOL

Reg. U. S. Pat. Off.

THE MULTI-PURPOSE CUTTING FLUID

ROUSTABOUT CRANE

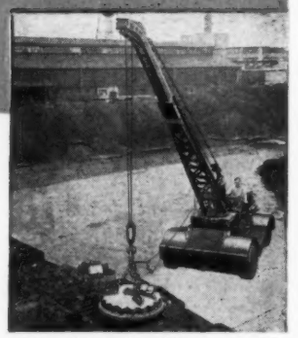
. . . Does 10 times more time-saving, cost-cutting work than you expect when you buy it . . .



The fast-action load-handler all around your place

Hundreds of users who have bought the Roustabout with a few jobs in mind, soon had it speeding 101 jobs of loading, unloading, moving, shifting and stacking, indoors but especially out. Mobile, it's *where* you want it *when* you want, over rough ground or smooth, up hill and down, handling anything to 7½ tons. Modernly engineered for years of overwork, ball-bearing boom turntable and gears all running in oil. It saves costly delays and manpower, quickly pays for itself. Write for the whole efficiency story now — no obligation, of course.

THE HUGHES-KEENAN COMPANY
623 NEWMAN STREET • MANSFIELD, OHIO

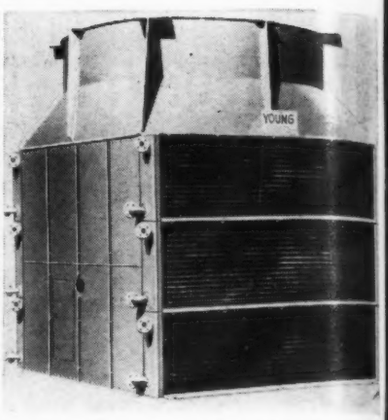


• Equipped with magnet, Roustabout handles scrap, ingots, etc.

• With grab-bucket, Roustabout hustles sand, cinders, etc.

ROUSTABOUT CRANE

Roustabout Cranes
By Hughes-Keenan
Load-Handling Specialists Since 1904



gas cooling, or in combination arrangements to handle two or more types of service. Vertical air discharge with an induced draft fan, low speed fan, coils mounted in a vertical plane, maximum protection from the elements, simple manifolding to supply and return lines, and other features are included. Young Radiator Co., Racine, Wis.

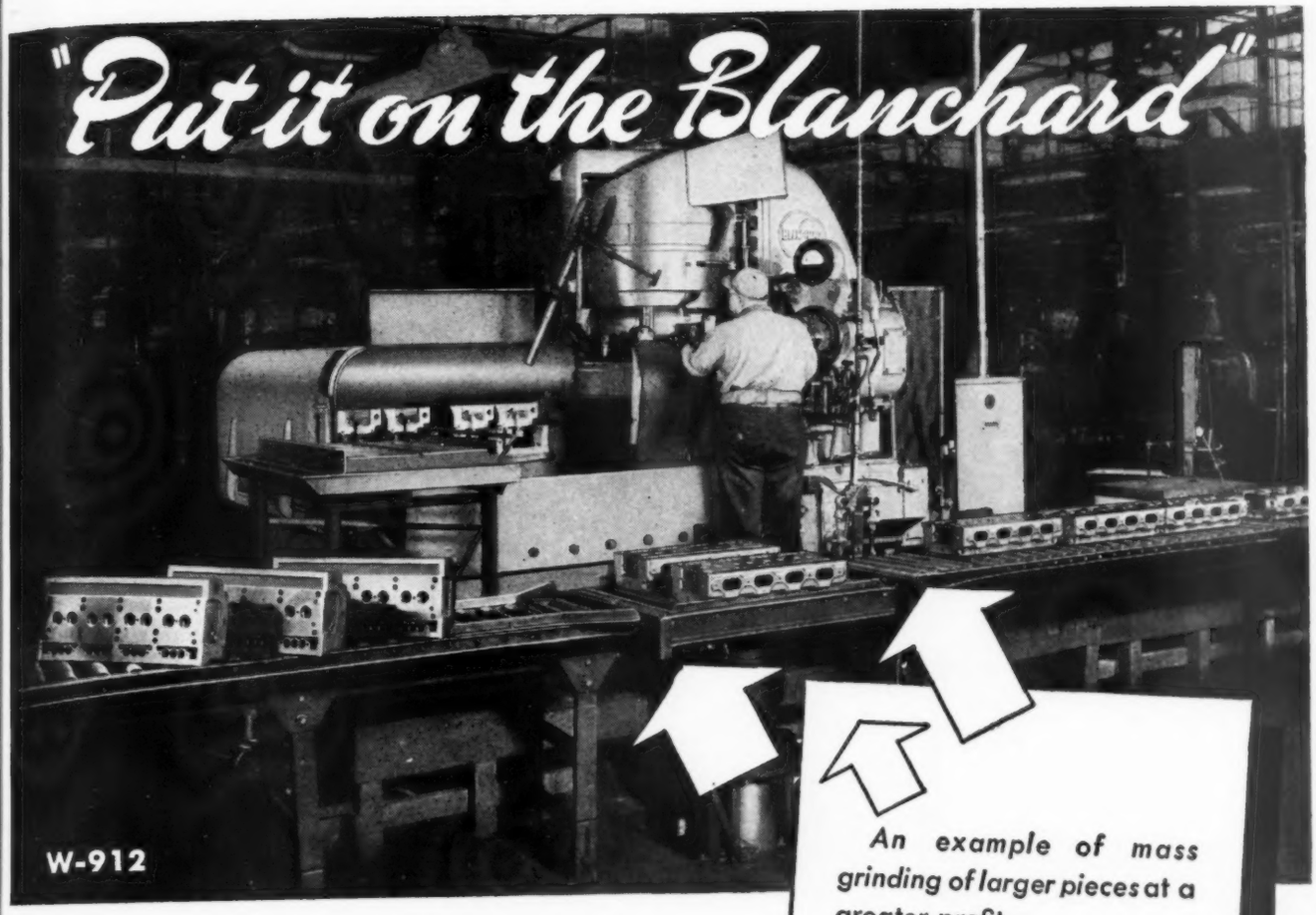
FLOOR MAINTENANCE MACHINE

Extra-low disc-type floor machine for polishing, scrubbing, steel wooling, and other maintenance, features a side-polishing brush which cleans flush with the walls. Having bristles extending beyond the disc, and 2 inches high, the

brush eliminates bumping and scratching equipment. The machine is less than 12 inches high because motor is "pancake-shaped" and centrally mounted over the cleaning disc. This permits operating under machinery. Features positive gear drive, splash-proof protection, and adjustable handle. G. H. Tennant Co., 2530 North 2 St., Minneapolis 11.

MANIFOLD COUPLING

Affording a positive seal, coupling can be used for all types of manifold joints operating under conditions of high temperature and excessive vibration. Wedging action of retainer ring draws together the flanges of the manifold joint as coupling is tightened, and high axial component of clamp band tension trans-



An example of mass grinding of larger pieces at a greater profit.

Four diesel cylinder heads are held on a 60" magnetic chuck of a No. 27 Blanchard Surface Grinder. The material is cast iron. Each head measures 25½" x 10¼" x 5 3/16".

Average stock removal per side is .005". One side is ground flat within .001".

Production is 27 pieces (27 surfaces) per hour. This includes loading and unloading time.

THE MOST PROFITABLE WORDS IN FLAT SURFACE GRINDING

Whatever type of flat surface grinding your parts may require—be it simple "cleaning up"—or rough grind *and* finish grind in *one* operation—or very flat surfaces with a fine finish and held to close limits—*there is no more profitable method*, in practically all cases, than to "Put it on the Blanchard."

Blanchard's specialization in grinding flat surfaces assures you the most profitable flat surface grinding machines you can buy.

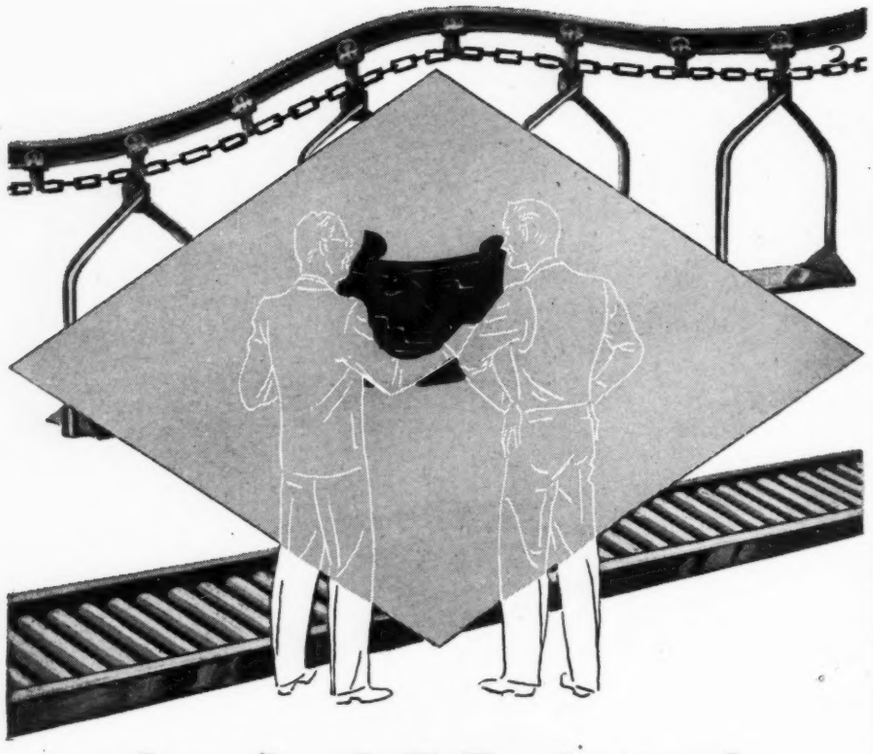
IF YOU MACHINE FLAT SURFACES . . . bring your problems to The Blanchard Machine Company.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



Can An A-F Engineered Co-ordinated Conveyor System Reduce *Your* Handling Costs?

Many factories—large and small—have proved beyond a doubt that an A-F *Engineered* completely co-ordinated conveyor system reduces handling costs in every department from unloading to shipping.

And we firmly believe that a frank discussion with our engineers will convince *you* that appreciable savings can be made in the handling of your raw materials and finished products in almost every department and between departments. An A-F Co-ordinated Conveyor system moves materials and products to—and away from—employees in an endless stream. Just think how such a system can increase efficiency and reduce costs in *your* plant.

What *type* of conveyor should you use? During the past 45 years we have solved many materials-handling and products-handling problems utilizing every type of conveyor in almost every type of plant. A discussion of your problem puts you under no obligation. Why not write—today?

45 YEARS OF SERVICE TO INDUSTRY

THE ALVEY-FERGUSON COMPANY

142 Disney St. *Offices in Principal Cities* Cincinnati 9, Ohio

CONVEYING EQUIPMENT

A-F CONVEYING MACHINERY

Alvey-Ferguson

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

mitted into wedging action provides the seal. Vented construction of retainer ring makes it possible for the coupling to remain at one-half the temperature of the manifold, tightening the seal as temperature of manifold rises. Coupling is suitable for any manifold equipped with machined or rolled flanges. Marman Products Co., Inc., 940 West Redondo Blvd., Inglewood, Calif.

GANTRY CRANE

Portability, ease in handling, and flexibility for varied lifting services are the features of gantry crane. Of 1-ton capacity, with large safety factor and

minimum gantry weight, it can be used on loading platforms and docks, in power plants, machine shops, factories, and for construction and maintenance work. The crane can be dismantled for storage or shipment. Industrial Equipment Co., 315 North Ada St., Chicago 7.

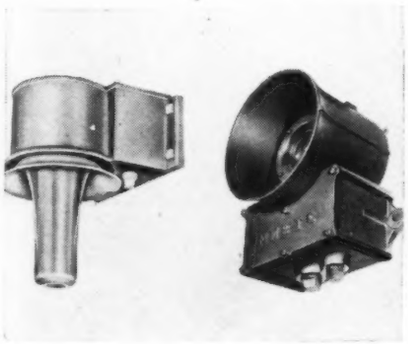
MULTIPLE BREAKER

Incorporating thermal and high-speed magnetic tripping action, the 4-pole MO 4 Multi-Breaker provides dual protection. The bi-metal element functions only when a sustained overload or heavy short circuit occurs, and does not trip under harmless, momentary overloads. The magnetic trip clears the circuit instantly under moderate or heavy short-circuit conditions. Measures $5\frac{1}{16}$x$7\frac{3}{16}$x$2\frac{7}{8}$

inches. The magnetic trip is coilless. The circuit breaker is available in single-pole branch circuit capacities of 15, 20, and 30 amperes. Handle tie furnished with each unit provides means of converting to one or two double-pole 3-wire circuits. Federal Electric Products Co., 50 Paris St., Newark 5, N. J.

LOUDSPEAKER

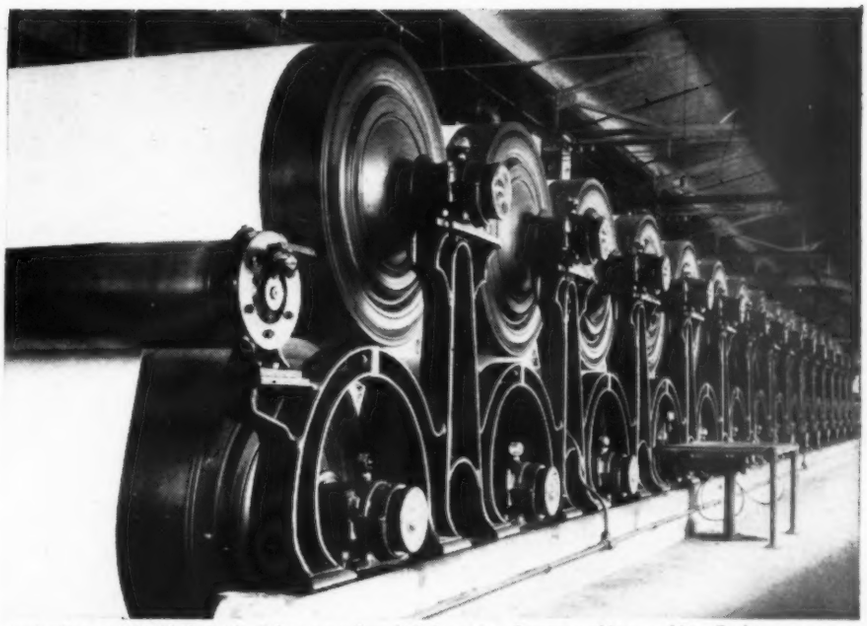
Submergence- and explosion-proof loudspeakers are built of rugged aluminum castings and equipped with Alnico V permanent magnet dynamic driver units. Models MSR and MM-2TC consist of reflex air column horn and hermetically sealed housing with built-in driver unit. The housing also pro-



vides facilities for a constant-impedance attenuator and a line matching transformer. Model MM-2TC is a directional speaker with removable reflector, while MSR includes a radial deflector for 360-deg. dispersion. Tapped holes are provided in housings for access to attenuator and for receiving a conduit. University Loudspeakers, Inc., 225 Varick St., New York 14.

WELDING SPRAYGUN

Spraywelder, a welding spraygun, is operated in the first part of the process as a powder metalizing unit to apply a uniform overlay of alloy. It is then used as a conventional welding torch to fuse the sprayed overlay to the base metal. Two control valves are mounted on the gun. Once adjusted, the powder flow may be stopped and started by pressing or releasing the trigger. The lightweight



Lunkenheimer "Visible" Bottle Oilers on roller shaft bearings of paper-making machine, Taylor Fibre Company, Norristown, Pa. This machine manufacturers paper for Taylor Vulcanized Fibre and paper-base grades of Taylor Phenol Fibre.

LUNKENHEIMER *Visible*

BOTTLE OILERS *Lubricate Dependably, Save Time, Labor, Oil and Trouble...*

Old-fashioned hand oiling methods have no place in the otherwise streamlined efficiency and economy of modern industry. Such laborious, costly operations are a steady drain on profits.

Industries the nation over have found an answer to this excess-cost lubrication problem—in LUNKENHEIMER "Visible" Bottle Oilers. These efficient, dependable Oilers are fully automatic, and being always in clear view, can easily be checked. They feed the right amount of oil, in the right way, at the right time, to the right place... and only when the bearings are in operation. When machinery stops, the oil feed stops.

With these Oilers there is no wastage or hazard due to oil spilled on floors, no oil drip on product, and none of the loss of time incident to frequent hand oiling. Plant production is speeded up... machinery and repair costs lowered... power consumption reduced... fire and accident possibilities lessened. Descriptive Circular No. 560 available on request.

Fig. 1815—BOTTLE OILER—Globe Body Fully automatic, insures efficient, uniform, economical lubrication of bearing. Feeds oil only when shaft is in motion.

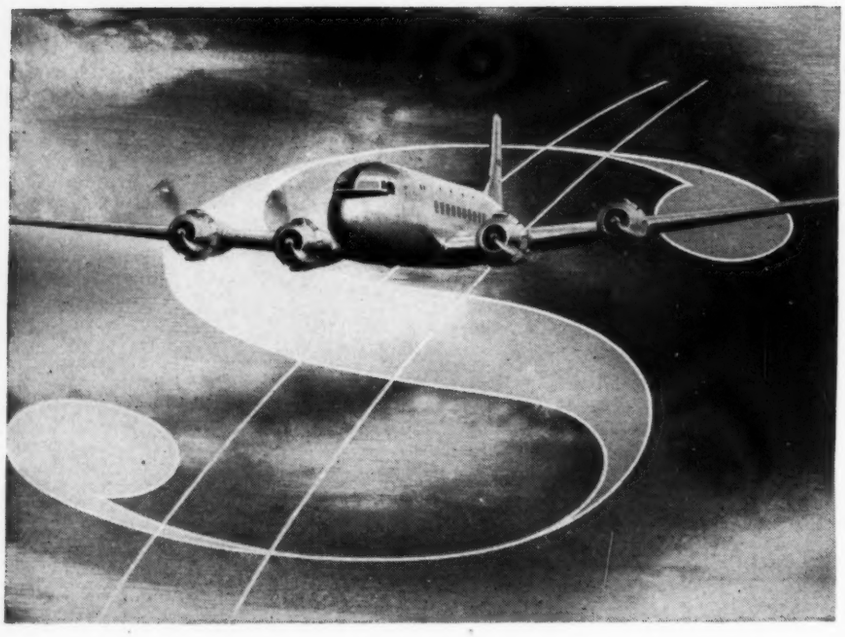
SEE YOUR LUNKENHEIMER DISTRIBUTOR

Lunkenheimer Distributors are located in principal industrial centers. There is one near you, fully equipped to assist with your maintenance and operation problems. Call on him!

THE LUNKENHEIMER CO., Cincinnati 14, Ohio

NEW YORK 13, CHICAGO 6, BOSTON 10, PHILADELPHIA 7.

EXPORT DEPARTMENT: 318-322 HUDSON ST., NEW YORK 13, N. Y.



Profits will fly your way when you use the speed of AIR EXPRESS

Business delays mean that overhead goes up, profits go down. When tools, replacement parts and critical materials are needed *fast*, when a customer wants an item that's "fresh out" — specify delivery by Air Express.

This speedy delivery service brings distant suppliers and warehouses mere hours from your door. So keep things moving by Air Express. This way, customers stay satisfied, profits stay up.

The cost? Much less than you'd think. Rates have been slashed 22% since 1943—all the more reason why the nation's business finds Air Express essential to profit-making.

Specify Air Express-a Good Business Buy

Shipments go everywhere at the speed of flight between principal U. S. towns and cities, with cost including special pick-up and delivery. Same-day delivery between many airport towns and cities. Fastest air-rail service to and from 23,000 off-airline communities in the United States. Service direct by air to and from scores of foreign countries in the world's best planes, giving the world's best service.

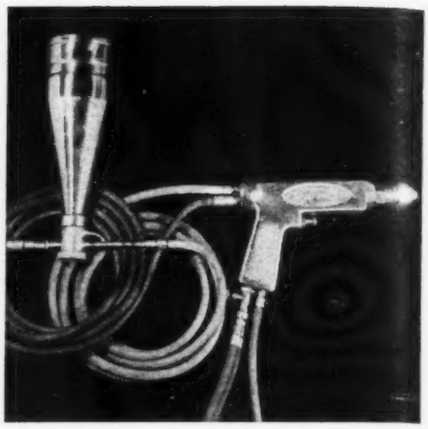
RATES CUT 22% SINCE 1943 (U. S. A.)					
AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Cents per lb.
149	$1.00	$1.00	$1.00	$1.23	3.07c
349	1.02	1.18	2.30	3.68	9.21c
549	1.07	1.42	3.84	6.14	15.35c
1049	1.17	1.98	7.68	12.28	30.70c
2349	1.45	3.53	17.65	28.24	70.61c
Over 2350	1.47	3.68	18.42	29.47	73.68c
INTERNATIONAL RATES ALSO REDUCED					

AIR EXPRESS

GETS THERE FIRST

Ask Today for the Time and Rate Schedule on Air Express. It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17, N.Y. Or ask for it at any Airline or Railway Express office.

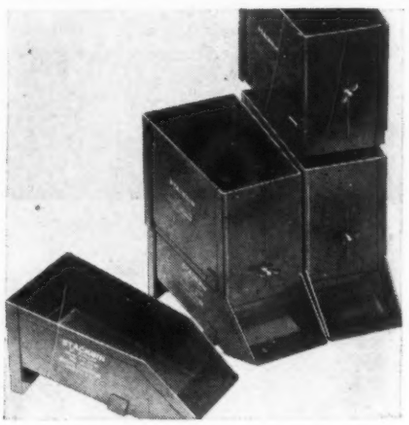
Phone AIR EXPRESS DIVISION, RAILWAY EXPRESS AGENCY
Representing the AIRLINES of the United States



gun may be hand operated, or held in a vise, and may be operated in all positions. The hopper for the powdered metal and the carburetor are combined in a single unit, and a panel holds all the equipment. Wall Colmonoy Corp., 19345 John R., Detroit 3.

ADJUSTABLE HOPPERS

Preventing overflows or jamming of parts, sliding-front hoppers regulate the flow of small parts in assembly bins. Provide maximum capacity for parts, regulating flow according to sizes and weights. When two hoppers are used,



one on top of the other, the increased weight of parts can be offset by adjusting the size of the opening. The all-welded units are made of heavy-gage sheet steel. Attached to bins without the use of nuts and bolts, the hoppers remain rigid. Stackbin Corp., Providence, R. I.

PAINT REMOVER

Bull Dog Remover contains a quick-acting solvent for removing coats of old paint, varnish, enamel, shellac, and lacquer. Supplied in liquid or cream form, it can be used on upright or flat surfaces. Stays moist and deep-cutting as long as 24 hours in the hot sun, reducing hard finish coats to a sludge that can be readily stripped off without leaving a greasy film, according to the manufacturer. Has no disagreeable odor, is free from acid and alkali reactions, and is non-corrosive. Additional claims are that it

• ENGINEERED AND MOLDED AT NO. 1 PLASTICS AVENUE

A clear case for plastics

Here's the battery that speaks for itself. Its transparent case lets you see the liquid-level at a glance . . . and a hydrometer, molded into the case, tells the charge. It's the storage battery for the G-E self-charging portable radio.

During the war, plastics battery cases proved their value in walkie-talkies, storm lamps, and other military items. For this Willard storage battery, the leakproof, acid-resistant case is injection-molded to exacting specifications by General Electric. The material is polystyrene—lighter than glass and stronger than hard rubber. G. E.'s *complete* plastics service covers every step in the design and manufacture of plastics products.

Have you a plastics product to design? Consult General Electric—world's largest manufacturer of finished plastics products. We'll be glad to send you a new booklet, "What Are Plastics?" Write Plastics Divisions, Chemical Department, General Electric Company, 1 Plastics Avenue, Pittsfield, Mass.

G-E Complete Service—Everything in Plastics

BACKED BY 52 YEARS OF EXPERIENCE. We've been designing and manufacturing plastics products ever since 1894. G-E Research works continually to develop new materials, new processes, new applications.

NO. 1 PLASTICS AVENUE —complete plastics service—engineering, design and mold-making. Our own industrial designers and engineers, working together, create plastics parts that are both scientifically sound and good-looking. Our own toolrooms are manned by skilled craftsmen—average precision mold experience, 12 years.

ALL TYPES OF PLASTICS. Facilities for compression, injection, transfer and cold molding . . . for both high and low pressure laminating . . . for fabricating. And G-E Quality Control —a byword in industry—means as many as 160 inspections and analyses for a single plastic part.

GENERAL ELECTRIC

GD 46-A18

GENERAL ELECTRIC PLASTICS FACTORIES ARE LOCATED AT SCRANTON, PA., MERIDEN, CONN. FORT WAYNE, IND., TAUNTON, WEST LYNN, AND PITTSFIELD, MASS.

APPROVED ...

"for safety, practicability and efficiency in general service"

by the U. S. BUREAU OF MINES

PERMISSIBLE
THREE-QUARTER HOUR
SELF-CONTAINED OXYGEN-GENERATING
BREATHING APPARATUS

APPROVAL NO. 1307

Issued for safety, practicability, and efficiency in general service to the
MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U. S. A.

CAUTION

1. Approved only for respiratory protection in oxygen-deficient atmospheres, or in vapors or gases which do not poison by skin absorption. (Hydrocyanic acid gas is absorbed through the skin.)
2. Not approved for successive wearing periods or prolonged use in highly concentrated petroleum vapors.
3. Approved only when assembled with Bureau of Mines approval No. 1307 canister and Bureau of Mines approval No. 1307 facepiece.
4. The cautions and instructions printed on the oxygen-generating canister must be fully complied with.

M·S·A

Chemox

SELF-GENERATING

OXYGEN BREATHING APPARATUS

Now, approval of CHEMOX by the U.S. Bureau of Mines—official government testing agency for respiratory protective equipment—joins the mass user-approval of industry, fire departments and public services from coast-to-coast!

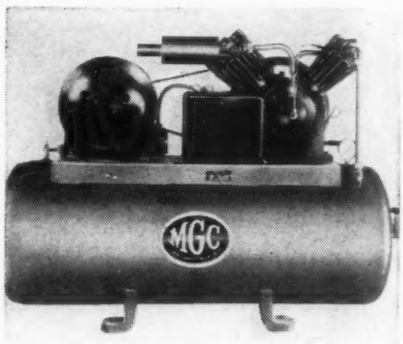
CHEMOX is the *only* self-generating oxygen breathing apparatus. CHEMOX gives *complete* respiratory protection in atmospheres containing toxic gases, oxygen deficiency, or both—for forty-five minutes at hard work. CHEMOX weighs only 13½ lbs. complete with replaceable canister—is simple to use and maintain! *Write for new descriptive Bulletin BM-14.*

MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas and Meade Streets • Pittsburgh 8, Pa.
District Representatives in Principal Cities
In Canada: MINE SAFETY APPLIANCES COMPANY OF CANADA, LTD., TORONTO
MONTREAL • VANCOUVER • CALGARY • WINNIPEG • NEW GLASGOW, N. S.

will not raise wood grain, damage the fiber, or injure the user or brush used to apply it. Supplied in gallons, quarts, pints, and half-pints. Gillespie Varnish Co., Dey St., Jersey City 6, N. J.

AIR COMPRESSORS

Super-Duty Two-Stage air compressors, in 7-, 9-, 13-, and 21-cu. ft. capacities, are furnished with 80-gal. storage tanks; a 60-gal. tank is optional with the 7-cu. ft. unit. The compressors are self-contained, with motor and compressor mounted on a one-piece steel sub-base which is electrically welded to an 80-gal.



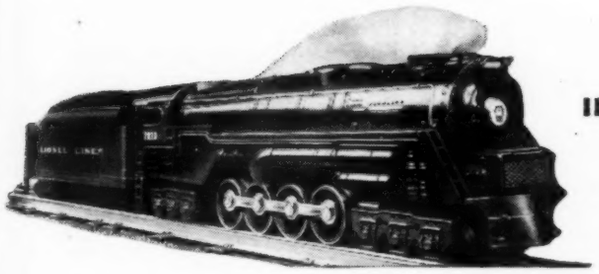
horizontal air receiver. They are fully automatic and controlled by centrifugal type unloading valves which are protected against motor burn-out. Power transmission is direct from the heavy-duty motor by multiple "V" belts with slack take-up. Has a fan-type flywheel for circulating air. Motor Generator Corp., Div of The Hobart Bros. Co., Troy, Ohio.

MASONRY DRILLS

Rotary drilling in non-metallic construction materials is the function of line of drills with cutting tips of hard cemented carbide. The tip extends beyond the diameter of the shank, providing annular clearance space around shank for cuttings. No starting punch is required on hard or brittle materials, and glazed surfaces are not chipped or cracked. The tip is designed to stay hard and sharp under heat of cutting, eliminating need for coolant, and to retain its edge under abrasive cutting. Can be sharpened on any tool grinder using loose bonded silicon carbide wheels. Made in sizes for ¼- and ½-in. drills. Kennametal, Inc., Latrobe, Pa.

PUSHBUTTONS, SWITCHES, AND INDICATING LIGHTS

Protection against entrance of oil is provided by a diaphragm seal and a rubber gasket in line of pushbutton units, selector switches, and indicating lights. The momentary-contact pushbuttons are made in several pole and circuit combinations, with silver, double-break contacts. The selector switch unit is obtainable in single-pole double-throw, or double-pole single-



INDEPENDENT INVESTIGATOR TELLS HOW . . .

LIONEL *gives Assembly a clear track*

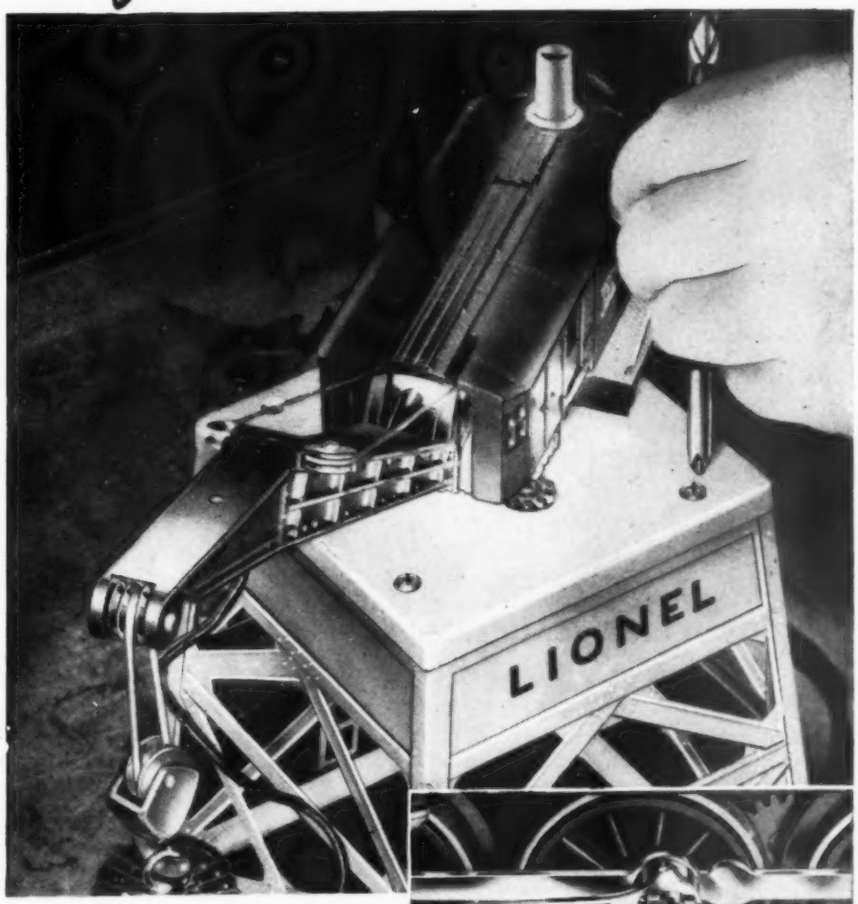
"We use Phillips Screws on 27 different products," Lionel's chief engineer told the Peck Co. investigator, on another study of assembly savings made by prominent manufacturers using Phillips Screws.

"PHILLIPS SCREWS ELIMINATE DRIVER SLIPS THAT USED TO COST A HALF MAN-HOUR EACH. On most parts for Lionel locomotives, cars, and accessories, the finish is applied before assembly, so that a driver slip meant disassembling the product and either junking the part or stripping off the paint for refinishing. The time lost would average about ½ man-hour per slip. This time is saved since we switched to Phillips Screws.

"PHILLIPS SCREWS MAKE DIFFICULT ASSEMBLIES EASIER, FASTER. Fastening the motor base inside the body of a model locomotive is one example. Space here is too small to allow holding a screw with the fingers. In many assemblies the space is too small to permit using even a screw holding attachment. Phillips Screws stay on the driver tip, make it a trouble-free, one-hand job.

"FINE APPEARANCE OF PHILLIPS RECESS IMPROVES APPEARANCE, and contributes to smart, modern design that appeals to our customers."

A WEALTH OF ASSEMBLY INFORMATION is available to you in the full report of this independent investigator's findings at the Lionel plant. Send for this and other reports, on metal, wood, and plastic products. Use coupon.



Fastening motor base to structure of Lionel model 182 electric crane with Phillips Screws. One push with a spiral driver finds the thread and sends home the screw without driver skids, and assembly slow-down.

The small flush-type Phillips Screw in the eccentric pin on this Lionel locomotive shows how the ornamental Phillips recess adds to smart, realistic design.

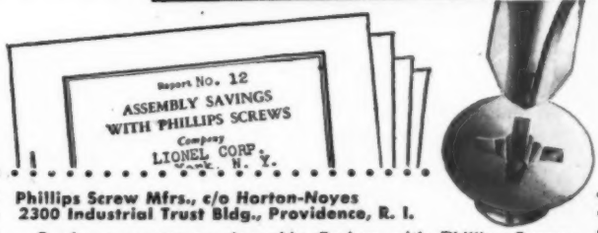
PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

American Screw Co.
Atlantic Screw Works
Atlas Bolt & Screw Co.
Central Screw Co.
Chandler Products Corp.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
The H. M. Harper Co.
International Screw Co.
Lamson & Sessions Co.

26 SOURCES

Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wolverine Bolt Company



Phillips Screw Mfrs., c/o Horton-Noyes
2300 Industrial Trust Bldg., Providence, R. I.

Send me reports on Assembly Savings with Phillips Screws.

Name .....

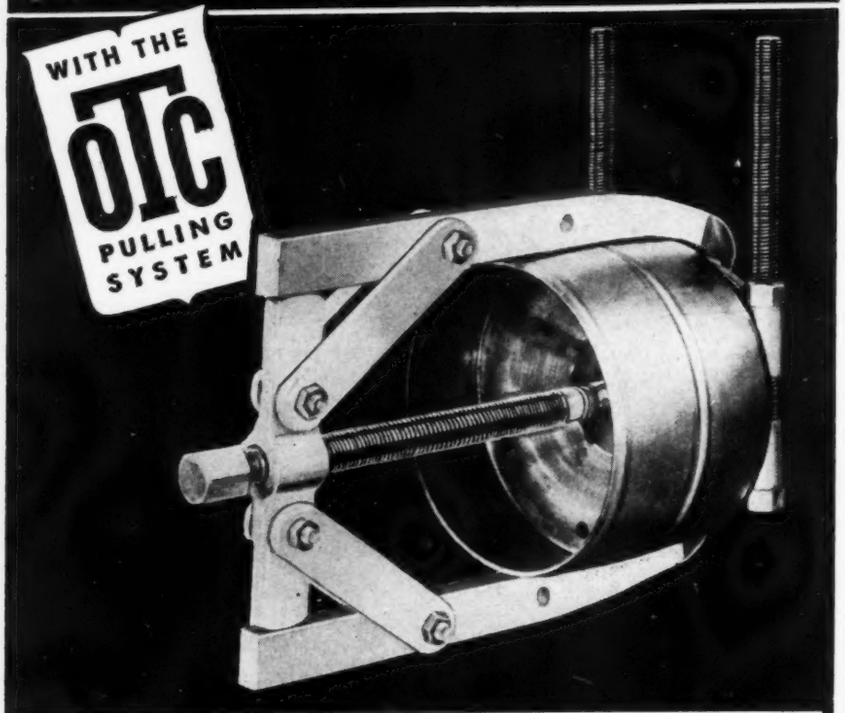
Company .....

Address .....

..... F-12

Cut MAINTENANCE COSTS

WITH THE OTC PULLING SYSTEM



Saves hours of time and hard work, and avoids parts breakage, in removing and replacing bearings, races, pinions, collars, pulleys, gears, sleeves, hubs, fly wheels, shafts, and other close-fitting parts. OTC is the only COMPLETE line of Pullers, Attachments and Special Tools. APPROVED by all leading bearing manufacturers.

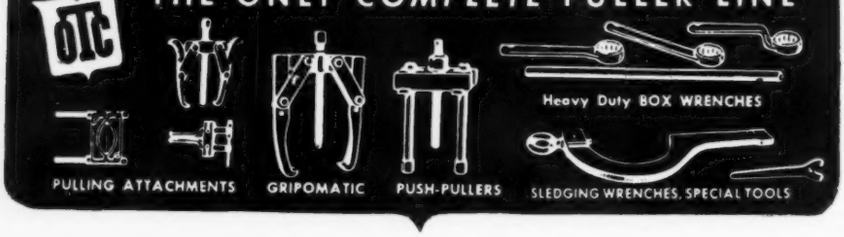
INDUSTRIAL MAINTENANCE SET No. PE-20

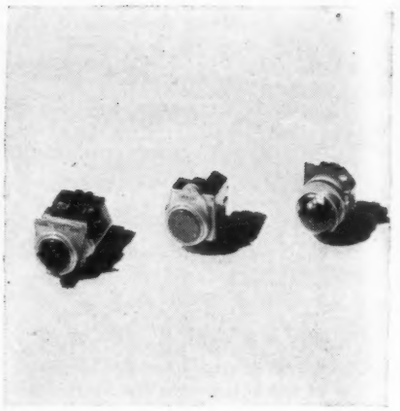
—developed especially for use on heavy machine tools, turbines, marine engines, mining machinery and other heavy equipment. Includes GRIPOMATIC PULLER of 70,500 lb. rating, Heavy Duty PUSH-PULLER with Extension Legs, Pulling Attachments and Heavy Duty Box Wrenches. Other OTC MAINTENANCE SETS of smaller capacity to provide complete pulling equipment at minimum cost for all factories, mills, utilities, R.R. shops, construction contractors, etc. Handy, sturdy service boards available.

ASK YOUR SUPPLY HOUSE or write for new Industrial Maintenance Bulletin PE-1946. It's a helpful guide to more efficient maintenance; shows many applications of OTC TOOLS in repair operations.

OWATONNA TOOL CO.
363 CEDAR STREET, OWATONNA, MINN.

THE ONLY *COMPLETE* PULLER LINE

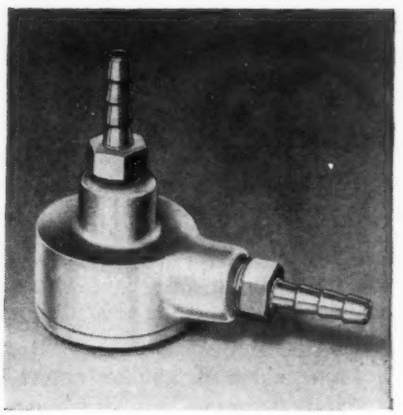




throw forms. Contacts are cam-operated. The indicating-light unit has single-pole mounting arrangement. They are available for use on 110-125 or 250 volts, a.c. or d.c., and may be used on higher voltages with separately mounted resistors. Control Div., General Electric Co., Schenectady.

EXHAUST VALVE

Acting on the principle of a bellows to expel the air quickly, exhaust valve for use with pneumatic cylinders automatically opens as soon as air supply is shut off. It can be attached directly to air cylin-



ders with a ¼-in. pipe nipple, or cut into the air hose adjacent to the cylinder. The number of strokes obtainable per minute is said to be 125. Over-all dimensions, exclusive of nipples, are body diameter, 1¾ inch; height, 1½ inch; length, 2¼ inches. Mead Specialties Co., Dept. EV. 1, 4114 North Knox Ave., Chicago 41.

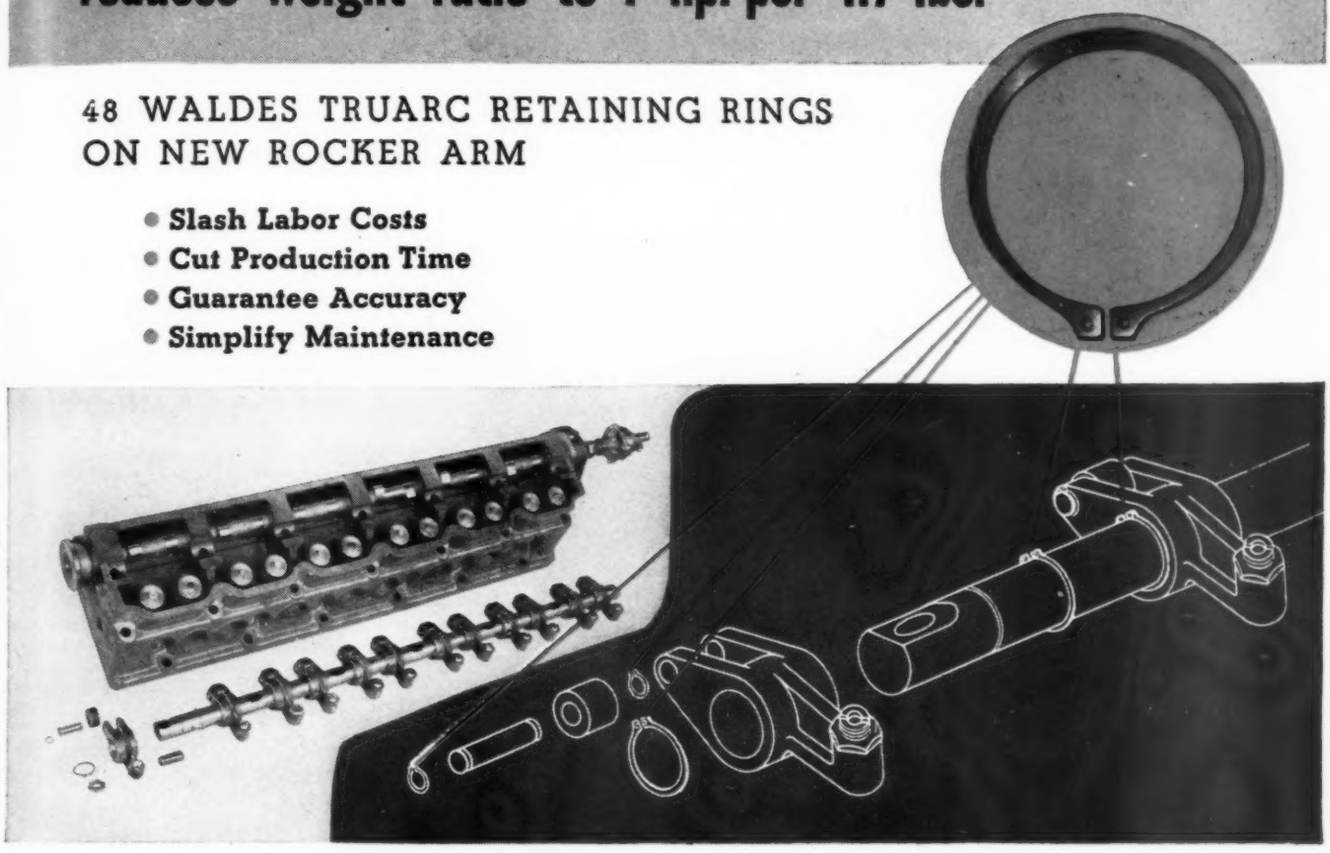
FLASHING

Thru-Wall Flashing is designed to prevent leaks and seepage, streaks, stains, efflorescence, and the rusting of spandrel beams in building walls. Saw-tooth corrugations that form a mechanical key bond in the mortar, vertically and laterally, make a water-tight joint without the use of solder; any moisture that might penetrate the flashing would drain quickly. Provides for expansion and contraction. Stiff counterflashing face fits the wall tightly after the base flashing

Twin Coach uses Truarc Rings on new bus engine—reduces weight ratio to 1 hp. per 4.7 lbs.

48 WALDES TRUARC RETAINING RINGS ON NEW ROCKER ARM

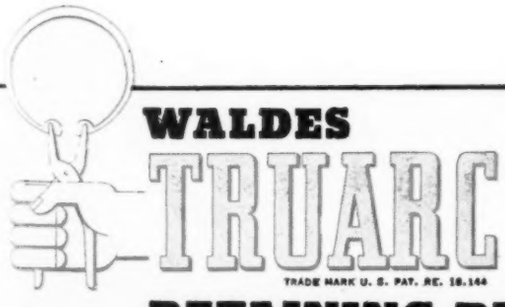
- **Slash Labor Costs**
- **Cut Production Time**
- **Guarantee Accuracy**
- **Simplify Maintenance**



"WE'VE FOUND TRUARC A NATURAL FOR AUTOMOTIVE APPLICATIONS!" reports Twin Coach Company, of Kent, Ohio. Their new Fageol Twin Coach engine uses a total of 52 Waldes Truarc Retaining Rings—48 on rocker arm, 4 on water pump and oil pump drive—to develop the remarkable efficiency of 1 hp. per 4.7 lbs. (the average pre-war gasoline bus engine produced 1 hp. for each 9 lbs., diesel engine 1 hp. for each 10 lbs.)

Automotive designers are specifying Truarc rings in transmissions, clutches, brakes, steering mechanism, and other vital assemblies. Production and maintenance men find that Truarc cuts costs sharply, is a superior solution to fastening problems because of its never-failing grip, its patented design assuring constant circularity. Send us your drawings; Waldes Truarc engineers will be glad to show how Truarc can help you.

Visit Truarc Booth • Power Show • Grand Central Palace, New York • December 2-7



WALDES TRUARC

TRADE MARK U. S. PAT. RE. 18,144

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

Waldes Kohinoor, Inc., 47-10 Austel Place 19-I
Long Island City 1, N. Y.

Please send Catalog No. 4 on Truarc Retaining Rings to:

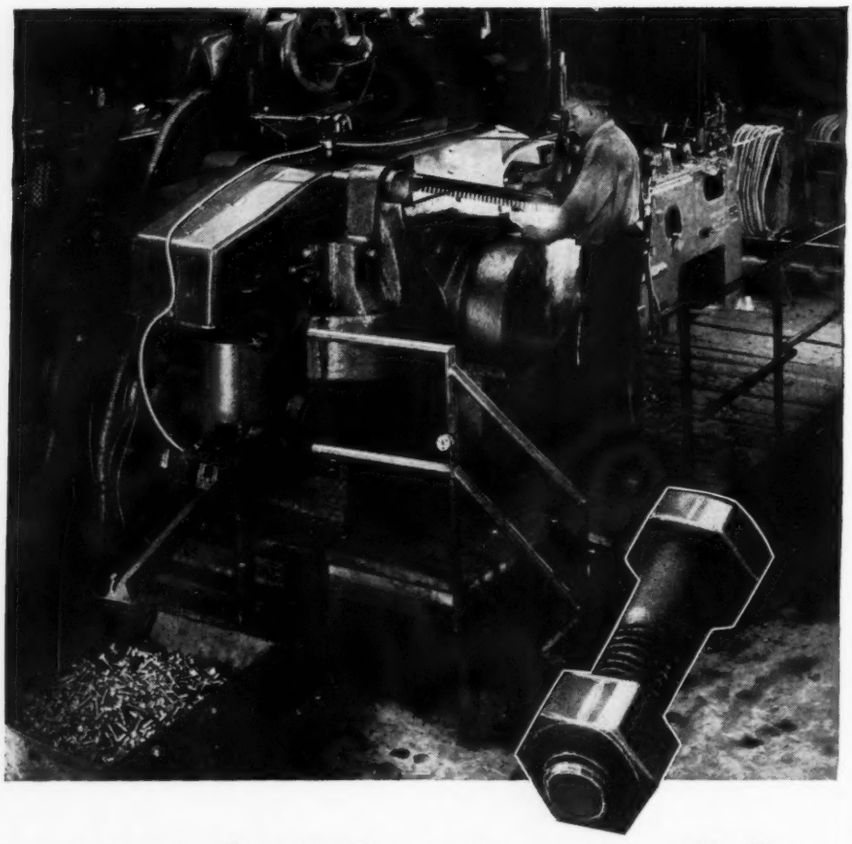
Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____



Accurately Made to Serve You Well

OLIVER FASTENERS

BOLTS, NUTS, RIVETS, CAP SCREWS

Better fits, faster threading-on, tighter joints, are assured by the accuracy of Oliver Industrial Fasteners. Above is shown one unit of a battery of modern bolt-making machines used in the production of Oliver bolts. Amazing accuracy and uniformity are here achieved with the advantages of cold-forming and mass-production.

Ordinarily the cost of installing and assembling an industrial fastener in a machine or fabricated structure is many times the cost of the fastener itself. Therefore, you want the best fasteners you can get. The greater dimensional accuracy, cleaner threads, well-formed heads and bodies of Oliver products are reflected in faster assembly and appreciable cost savings for you. When you specify OLIVER, you are sure of getting the best!

SEE YOUR DISTRIBUTOR FOR OLIVER PRODUCTS

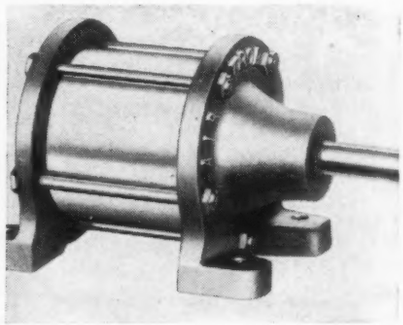
OLIVER IRON AND STEEL Corporation

SOUTH TENTH AND MURIEL STREETS · PITTSBURGH 3, PENNSYLVANIA

has been installed, and the flashing is easily bent by the sheet metal worker. Made in sheet form in standard widths up to and including 34 inches, in 6-ft. lengths. Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.

AIR CYLINDER

Material holding operations for drilling, reaming, tapping, milling, grinding, injection, and ejection are expedited by air cylinder said to simplify and speed up operations, and lower cost of jig design. Features claimed are true-bore



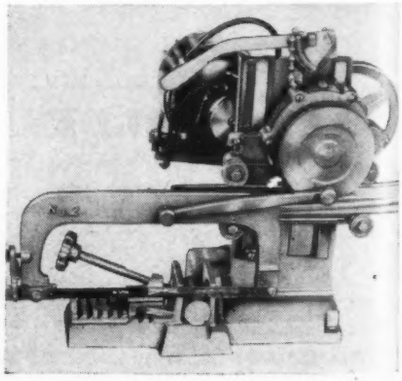
cylinders, non-rusting cylinder heads, oilless (graphite-impregnated) bronze ram bushings, and precision assembly. Sizes range from 1½ inch up, power factor from 1.76 times air line pressure. Cylinder is built for single or multiple setups. Foot control is available. Air-Trol, 2651 West Lake St., Chicago 12.

SPRAY BOOTH MASKING

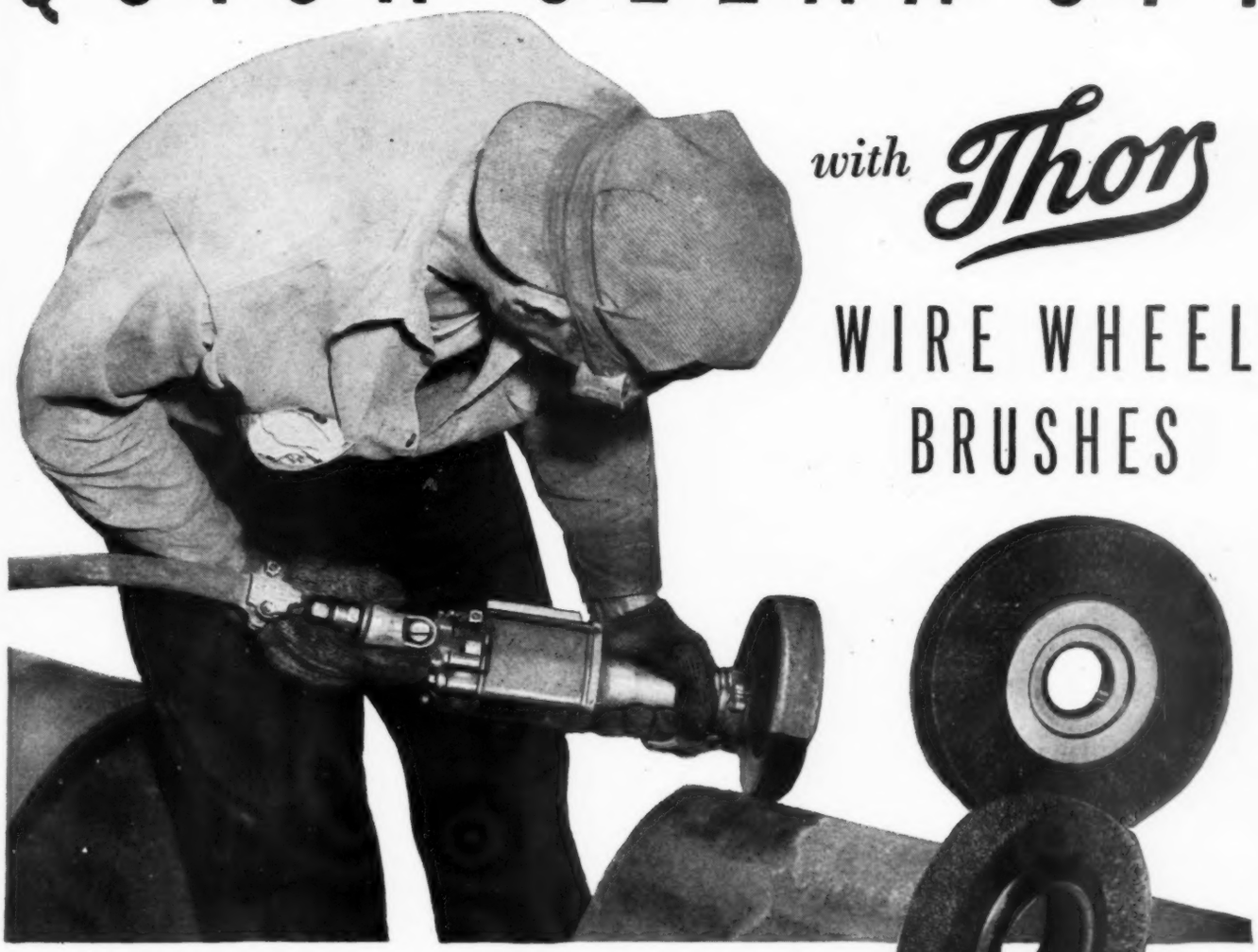
Filmite, a fluid compound sprayed or brushed on walls of paint spray booths, forms a tough skin over a non-hardening base. It catches, holds overspray, and peels off walls like scotch tape. Comes ready to use, is water soluble, easy to wash off, doesn't set hard, and skin effect halts paint penetration and adhesion. Said to be safe, non-flammable, non-irritant, non-corrosive, non-toxic, and to save up to 90 percent of labor in booth cleaning. DuBois Co., Cincinnati 3.

POWER HACKSAWS

Portable bench and floor type power hacksaws have been developed for fast stock-cutting in quantity. Floor Model



QUICK CLEAN-UP!



with Thor

WIRE WHEEL BRUSHES

Made for long, heavy duty service in removing rust—paint—scale—burrs —carbon and other material . . . and for cleaning, roughing, polishing and burnishing. THOR wire wheel brushes are available in sizes from 4″ to 12″ diameter in single-unit, arbor hole adaptor or metal-center sectional type. Brush sections are heavily filled with Double-Durable special crimp wire in gauges up to 36. These modern brushes will operate efficiently on portable and stationary equipment with spindle speeds up to 6000 R.P.M. Your nearby Thor Distributor carries a complete stock.

INDEPENDENT PNEUMATIC TOOL COMPANY

600 West Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York Philadelphia
Pittsburgh St. Louis Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

Delivering *Protection* to the job

IT'S WOLMANIZED LUMBER*

This roof deck is going to last longer . . . they're using Wolmanized Lumber, the lumber impregnated with Wolman Salts* preservative—highly resistant to decay and termite attack.

It is recommended for use in structures exposed to:

(1) Moisture in artificially humidified buildings
(2) Steam and vapor from industrial processes
(3) Condensed water vapor in walls, floors and ceilings of refrigerated buildings
(4) Soil moisture and rain water held in joints, etc., of outdoor structures
(5) Moisture condensed by concrete or masonry

When you buy Wolmanized Lumber, you get *pressure-treated* lumber—the only reliable kind.

*Registered trademarks

1676 McCORMICK BUILDING, CHICAGO 4, ILLINOIS

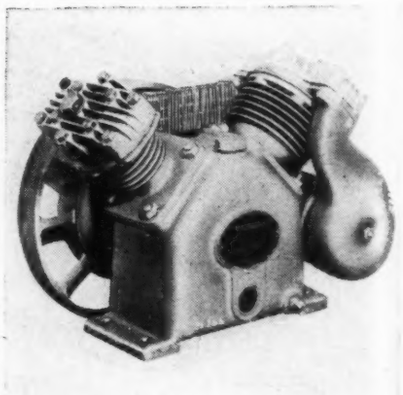
3 has a 6x6-in capacity, 14-in. power blade, and comes equipped with an integral coolant pump and reservoir. The No. 2 bench model has a 4x4-in. capacity, 12-in. blade, and is a dry-cut saw. T & S Engineering Co., 15 North Euclid Ave., Pasadena 1, Calif.

ABRASIVE WHEELS

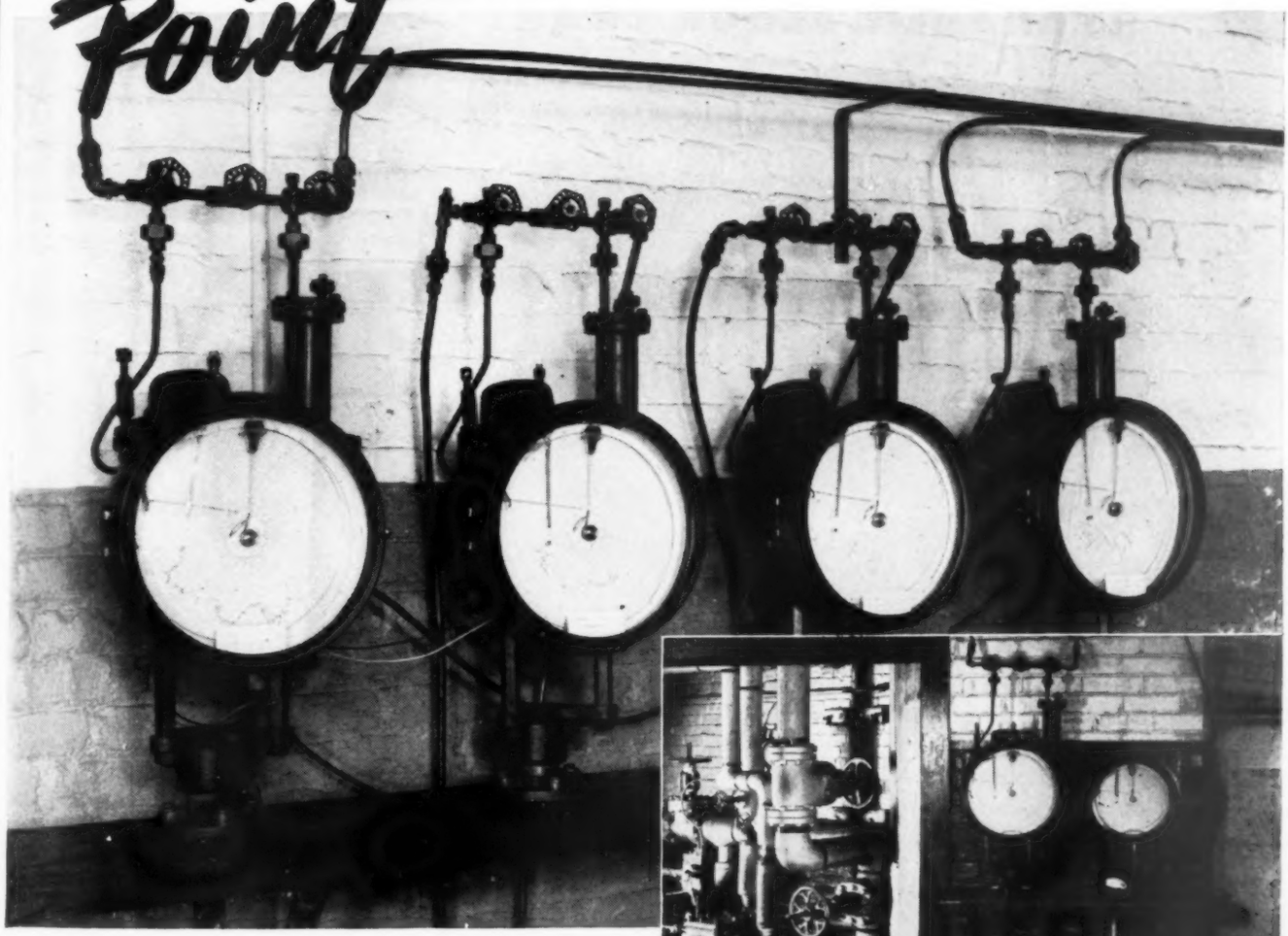
Bayflex raised hub abrasive disc wheels are used with welded or brazed metals, in foundries, sheet metal shops, automobile and truck body repairing shops, and welding shops. They are also suitable for grinding aluminum castings. The edge can be used for grinding and cutting, and the discs can be used down to the nut. Under normal conditions the wheels are not subject to "loading," but if loaded they can be cleaned by applying the face to a concrete floor. Fit any standard machine. Bay State Abrasive Products Co., Westboro, Mass.

AIR COMPRESSORS

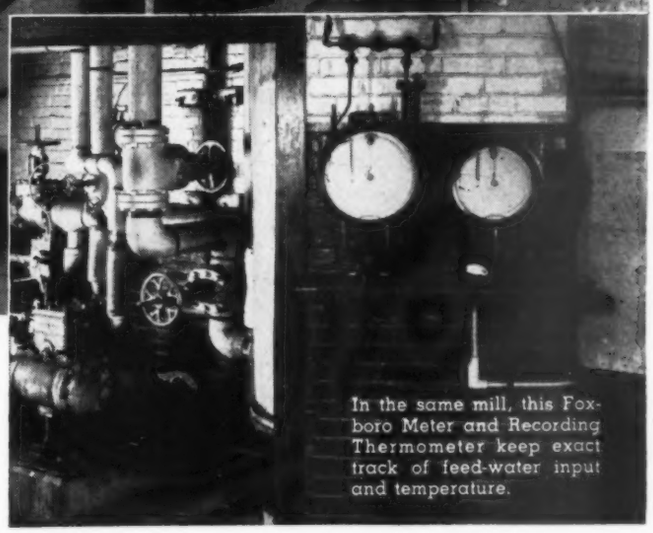
Designated Air King, line of air compressors includes single-stage and two-stage sizes for pressures up to 250 p.s.i. for mating to standard motors of 1 to 15 hp. Arrangements include self-contained power-driven models mounted on bases or tanks, as well as bare compressors for either direct or V-belt connection to drivers. Supply air for paint-spraying, pneumatic controls, tools, cleaning and blowing, inflating tires, and similar applications. A cen-



Starting Point for Lower-Cost Production . . .



These Foxboro Flow Recorders in a large woolen mill keep accurate records of (1) process steam to mill, (2 and 3) condenser water, and (4) steam to turbine.



In the same mill, this Foxboro Meter and Recording Thermometer keep exact track of feed-water input and temperature.

FOXBORO METERING OF BOILER INPUT AND OUTPUT REVEALS HOW TO MINIMIZE COSTS!

Equip your boiler-room and process steam lines with Foxboro Flow Meters, and you'll have a continuous, unerring check on just where every dollar of your coal bill goes. Accurate 24-hour records will show-up any steam-wasting process that needs correction . . . piping leaks or inefficient operation also can be "spotted".

Foxboro Flow Meters are permanently accurate because of simple and extra-rugged construction; and Sure-Seal Check Valves positively block mercury loss, even under severe overrange. They are the only meters with patented straight-line mechanisms that eliminate inaccuracies caused by angularity between the float and the recording pen.

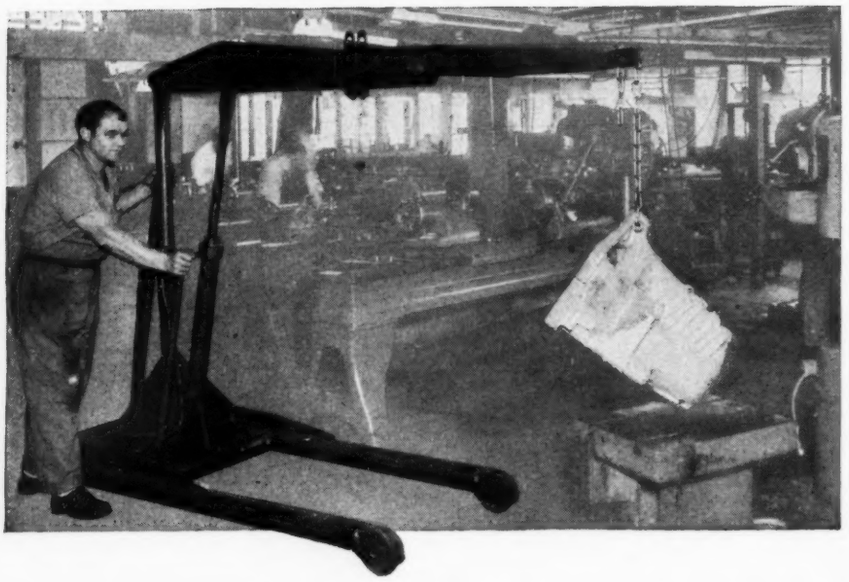
Look into the 3-way economy of Foxboro Meters for your plant . . . lower purchase cost, lower maintenance, and unerring guidance for fuel saving. Write for Bulletin 200-7 describing Foxboro's complete line of Recording, Controlling and Indicating Meters. **The Foxboro Company, 24 Neponset Avenue, Foxboro, Mass.** Also Montreal, Canada. Branches in principal cities.

FOXBORO
REG. U. S. PAT. OFF.

DIFFERENTIAL-TYPE FLOW METERS

NO OTHER LIKE IT . . .

LOW COST RUGER HYDRAULIC FLOOR CRANE



STRANGE somebody didn't think of it before . . . this patented, effective combination of smooth hydraulic power and sturdy cantilever boom that makes light work out of so many different kinds of heavy handling jobs.

The Ruger picks up loads right off the floor or from any height within its range . . . lifts or lowers as required . . . travels with load wherever you can push a hand truck.

Works in tight places, or with crane hook reaching over obstacles to pick up loads that could otherwise only be handled by expensive overhead cranes. Large diameter front wheels and double rear swivel caster make the Ruger easy to maneuver in close quarters.

Simple, and Safe. Only 2 controls: (1) lever that operates hydraulic pump to raise the load; (2) release valve to lower the load. Anyone can operate a Ruger.

With release valve closed, load is positively supported at any height by pressure in the hydraulic lifting cylinder. Fine-threaded release valve stem enables load to be lowered smoothly, gently . . . fast or slow . . . minimizes danger of accidents to men and damage to loads.

Ruger Hydraulic Floor Cranes are built in 1-ton, 2-ton and 3-ton sizes. Write for prices and complete illustrated bulletin to nearest address below.

RUGER *Equipment Co., Inc.*

Load Lifting and Handling Devices

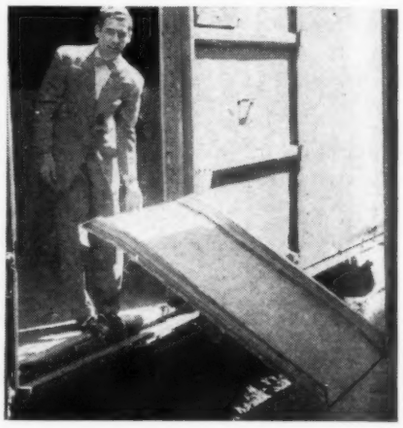
408 Leader Bldg.
Cleveland 14, Ohio

P. O. Box 3821
Portland 8, Oregon

trifugal clutch permits the driving motor to attain full speed before compressor turns. Direct power drive prevents transmission losses and eliminates drive adjustments. Worthington Pump & Machinery Corp., Harrison, N. J.

DOCKBOARDS

Light as well as strong, magnesium dockboards weigh approximately one-fourth as much as steel boards of equal strength and capacity, maker states. Made in about 530 standard sizes and capacities, the ramps are designed for use in any car or truck loading operation, even where axle loads are heavy. Constructed of non-sparking magnesium



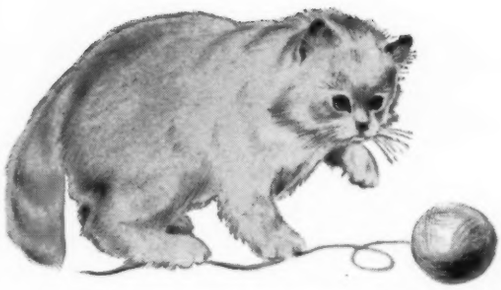
alloy, with non-skid raised pattern safety tread or smooth-finish floor plate, reinforced with structural members. They stay securely in position while in use, and differences in height are compensated for by slight bend in the dockboard. Magnesium Co. of America, 160 North La Salle St., Chicago 1.

CHRONOMETRIC TACHOMETER

Tachometer of the chronometric type measures shaft speeds from 1 to 10,000 r.p.m., or belt speeds from 1 to 3,000 r.p.m. in 3-second intervals, without gear ratio changes. High speed ranges are obtainable. Accurate within plus or minus ½ of 1 percent of measured speed, the 9-oz. instrument is made to fit into the hand for testing. Conveniently located operating buttons are provided for starting and resetting. The indicator hands remain at the measured speed position until the reset button is pressed. The unit is non-magnetic up to 2000 lines. Milwaukee Lock & Mfg. Co., 727 West Virginia St., Milwaukee 4.

FLEXIBLE CONDUIT

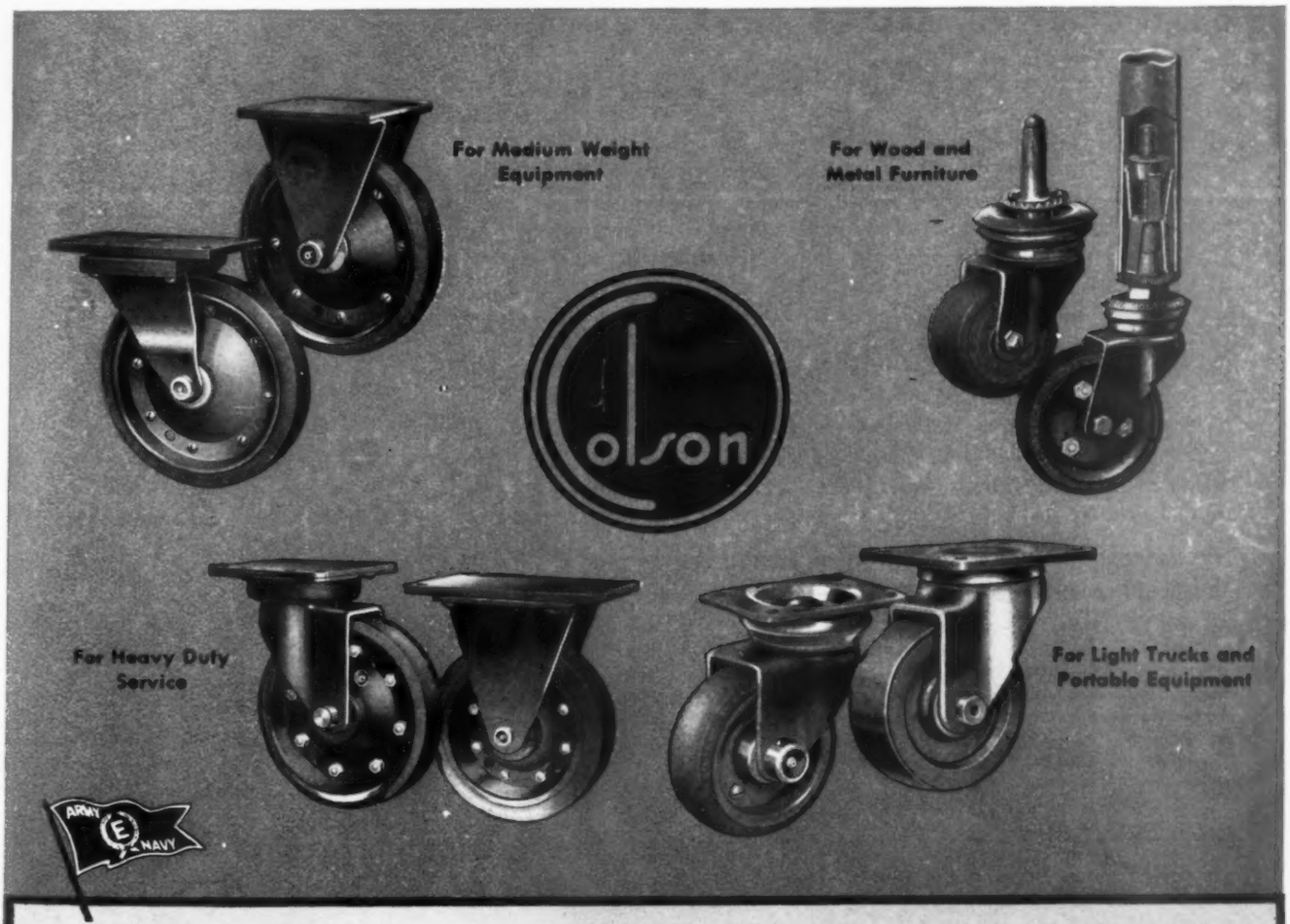
Sealtite electrical conduit covers electrical wiring on any machine which may come in contact with oil or moisture. Designed to prevent possible shorts or rotting insulation from seepage of oil drip or moisture, it is made of galvanized steel flexible tubing covered



COLSON CASTERS

—smooth as a cat's tread

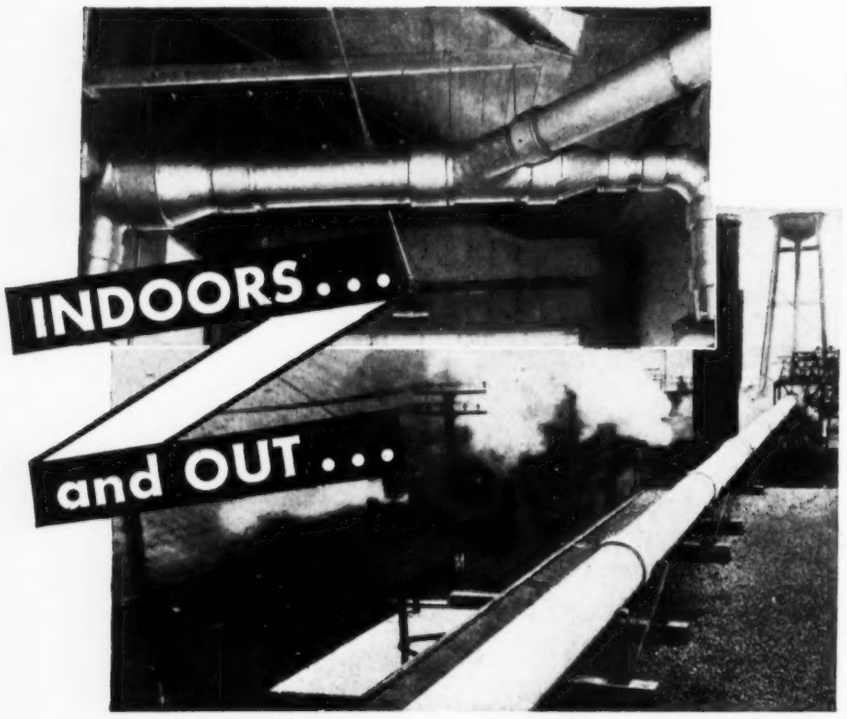
Equip your product with the casters that roll smoothly over all floor surfaces and are famous for trouble-free service and durability—Colson Casters. There are precision-built Colson Casters for every commercial, institutional and industrial use. Write now for detailed information.



THE COLSON CORPORATION

ELYRIA, OHIO

CASTERS · INDUSTRIAL TRUCKS AND PLATFORMS · LIFT JACK SYSTEMS · BICYCLES · CHILDREN'S VEHICLES
WHEEL CHAIRS · WHEEL STRETCHERS · INHALATORS · TRAY TRUCKS · DISH TRUCKS · INSTRUMENT TABLES



Here is a duct that Fights Corrosion!

MANY USERS of ducts, vents and stacks have found, in Johns-Manville Transite Industrial Vent Pipe, a practical answer to the problem of corrosion.

Strong and durable, this asbestos-cement pipe successfully resists many of the corrosive fumes, vapors, dusts and gases encountered in industrial operations.

Transite Industrial Vent Pipe is also immune to rust, as well as highly weather-resistant. It needs no painting, whether used indoors or out. It is easily installed, light in weight, and comes in a range of sizes up to 36" in diameter. A full line of Transite fittings assures corrosion-resistance throughout the system.

Data Sheet DS-336 gives full details and is free on request. Address Johns-Manville, 22 East 40th Street, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Typical industries in which Transite Industrial Vent Pipe is used

Aircraft	Dairy	Gas	Paint	Shipbuilding
Automobile	Drug	Glass	Petroleum	Shoe
Baking	Electrical	Laboratory	Potash	Smelting
Bleaching	Explosive	Laundry	Pulp & Paper	Soap
Boiler Works	Farm Machinery	Leather	Quarrying	Soft Drink
Brewing	Food	Match	Railroad	Sugar Refining
Canning	Foundry	Meat Packing	Rayon	Textile
Ceramic	Furnace	Metal	Refrigeration	Tool
Chemical	Furniture	Mining	Rubber	Water & Sewage

Johns-Manville TRANSITE Industrial Vent PIPE

with an oil-proof synthetic material. Conduit fittings are standard pipe thread, and are available for permanent attachment or reattachable for assembly on the job. Supplied in all standard sizes to 2-in. i.d. The American Metal Hose Branch of The American Brass Co., Waterbury 88, Conn.

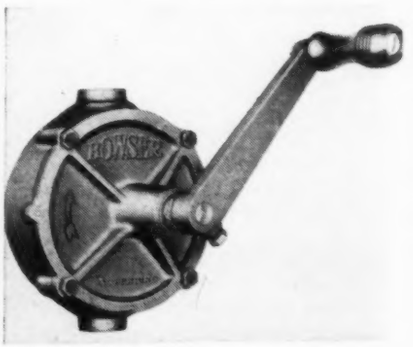
LIMIT SWITCHES

Small oilproof track-type limit switch for machine tool or similar applications can be used in a variety of operations through the use of interchangeable operating heads for roller-lever, roller-

push-rod, push-rod, or plunger actuation. Contains a single-pole, double-throw, self-contained, snap-action control Switchette. A sturdy, molded phenolic enclosure of oilproof construction protects it. General Electric Co., Schenectady.

ROTARY HAND PUMP

Ten g.p.m. at a normal cranking speed is the capacity of pump of the vane type with an aluminum rotor, graphite carbon



For **RELIABILITY**

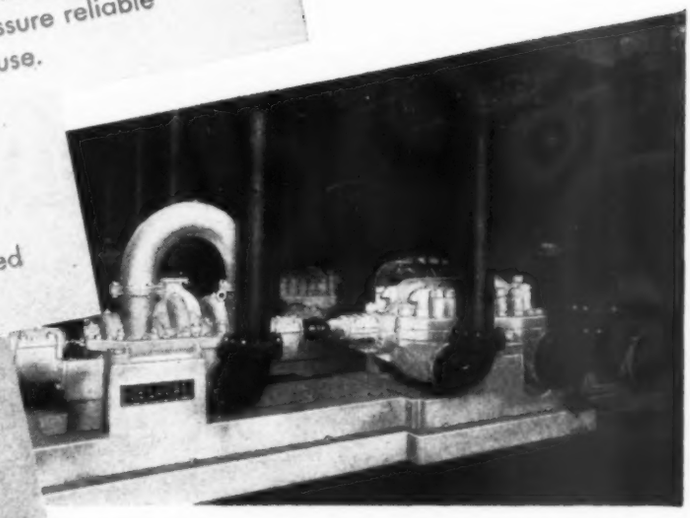
Ample clearances, high quality workmanship and proved features of design assure reliable operation over long periods of use.

ECONOMY

particularly where steam also is required for heating or process.

SPEED CONTROL

where close regulation and speed variation is desired.

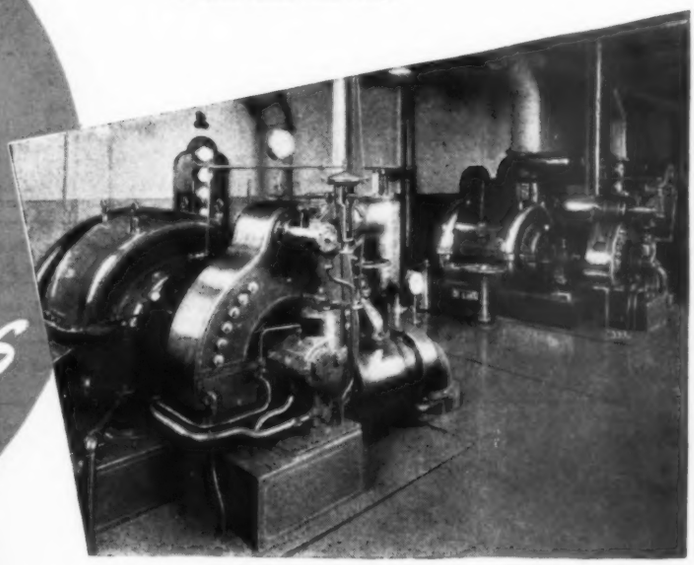


De Laval Class C Velocity Stage Turbine Driving De Laval Boiler Feed Pumps.

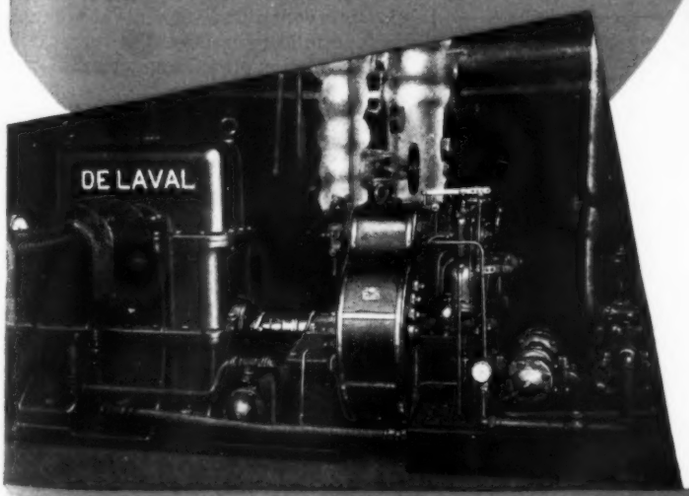
Install

DE LAVAL

SINGLE STAGE TURBINES



De Laval Centrifugal Compressor Driven by De Laval Velocity Stage Turbine. Exhaust Steam from the turbine is used in processes throughout the plant.



Paper Machine Driven by a 225 Horsepower De Laval Velocity Stage Turbine Through De Laval Worm Gear.

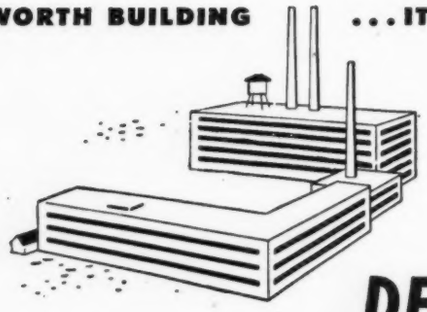
T-2

TURBINES · HELICAL GEARS · WORM GEAR SPEED REDUCERS · CENTRIFUGAL PUMPS · CENTRIFUGAL BLOWERS AND COMPRESSORS · IMO OIL PUMPS

DE LAVAL STEAM TURBINE COMPANY
TRENTON 2, NEW JERSEY

SALES OFFICES: ATLANTA · BOSTON · CHARLOTTE · CHICAGO · CLEVELAND · DENVER · DETROIT · DULUTH · EDMONTON · GREAT FALLS · HAVANA · HELENA · HOUSTON · KANSAS CITY · LOS ANGELES · MONTREAL NEW ORLEANS · NEW YORK · PHILADELPHIA · PITTSBURGH · ROCHESTER · ST. PAUL · SALT LAKE CITY · SAN FRANCISCO · SEATTLE · TORONTO · TULSA · VANCOUVER · WASHINGTON, D. C. · WINNIPEG

IF IT'S WORTH BUILDING ...IT'S WORTH SAVING



DEFEND IT from its 7 enemies

You can protect any building against the harmful effects of wear, dirt, disintegration, weather, moisture, rust or corrosion, inside or out, with Sonneborn "Building Savers."

The products in the chart below are a few of many which Sonneborn has developed to protect and preserve, renovate and decorate wood, metal, concrete, masonry and other building surfaces—new or old, large or small.

Sonneborn catalogs in SWEET'S give further information. For descriptive literature on specific Sonneborn "Building Savers" to help solve particular construction or maintenance problems, write Dept. F-12.

SONNEBORN "BUILDING SAVERS"	
This Product	**For This Purpose**
LAPIDOLITH	Hardening, wearproofing and dustproofing new or old concrete and terrazzo floors, other concrete surfaces.
LIGNOPHOL	Preserving and finishing wood floors, trim, doors, paneling—in one application.
CEMCOAT Filler and Dustproofer	Protecting and decorating cement and wood floors, porches, decks. Colors and transparent.
TRIMIX	Improving quality and workability of concrete and mortar mixes.
STORMTIGHT (Liquid and Plastic)	Protecting and preserving, patching and repairing roofs of all types, new or old.
S. R. P. ("Sure Rust Prevention")	Protecting iron, steel and other metal surfaces, inside and out, against rust and corrosion.
SONOLASTIC Aluminum Paint (Ready-Mixed)	Protecting and brightening interior and exterior surfaces —metal, wood, masonry, wallboard, etc.
SONNEBORN'S Caulking Compound	Caulking, pointing up, sealing, glazing, etc. Knife and gun grades.
SONOMEND	Patching and resurfacing concrete or wood floors.
FLOORLIFE CLEANER	Cleaning and waxing wood floors and linoleum in one application.
HYDROCIDE Colorless	Protecting exterior masonry walls against disintegration due to water absorption.

SONNEBORN "BUILDING SAVERS"

★

FLOOR TREATMENTS · WAXES · PAINTS AND PROTECTIVE COATINGS · CONCRETE AND MORTAR ADMIXTURES · WATERPROOFING AND DAMPPROOFING · CAULKING COMPOUNDS · ROOF COATINGS

BUILDING PRODUCTS DIVISION

L. SONNEBORN SONS, INC.

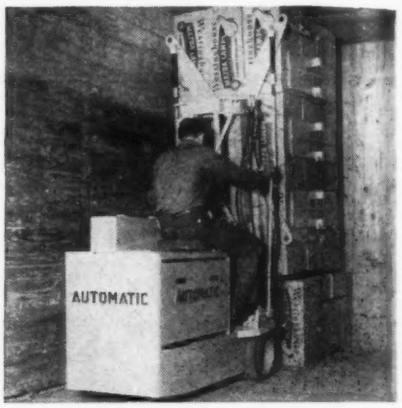
88 Lexington Avenue, New York 16, N. Y.

In the Southwest: Sonneborn Bros., Dallas 1, Texas

vanes, and stainless steel springs. Suction and discharge ports are threaded for ¾-in. iron pipe. Industrial Pump Div., Bowser, Inc., Fort Wayne, Ind.

INDUSTRIAL TRUCK

Handling light and bulky cartons as unit loads without pallet or skid, "clamp" truck operates with hydraulic pincers replacing the regular forks. The clamping pads, adjustable in height, are



mounted on a scissors-like frame opened by a hydraulic pump. Release of the hydraulic pressure allows the springs to pull the clamps together, grasping the load between them. Automatic Transportation Co., 149 West 87 St., Chicago.

CHART VIEWER

Lightweight chart viewer is designed to simplify the inspection of strip-chart records. Manufactured in two models, one for use with 4⅜-in. wide record rolls, and one for 4-in. wide rolls, the viewer is constructed of sheet aluminum, finished in gray crackle. The record roll to be viewed is placed in a trough at one end of the viewer, and the free end of the paper is wound on the spool of the other end by hand operation of a crank. Meter & Instrument Div., General Electric Co., Schenectady.

NYLON HAMMER

"Soft" hammer with faces of nylon is said to feature maximum wear, to handle well, not chip or mushroom, to have no rebound, to be resistant to fire, chemicals, and oils, and not heat up or change in shape under continued use. Has no projecting surfaces, and the nylon faces are replaceable. When inserted into the hammer head, they are locked in place. Available in ⅔- and 2-lb. weights. Danielson Mfg. Co., Danielson, Conn.

HEAVY-DUTY VISE

Known as the Vise Master, general utility speed vise closes instantly with a push on free jaw, and opens automatically by trigger release on its spring action. Equipped with "double bite" steel pipe jaws integral with the body,

GIVE YOUR PRODUCTS THE SPARKLE THAT SPARKS MORE SALES with 3M ABRASIVE BELTS

Watch Mrs. America as she walks through her favorite housewares department and you will find that the products that kindle that urge-to-buy look in her eye are the products with a smooth, lustrous finish. Realizing the importance of finish in influencing purchasers, manufacturers of everything from housewares to hydraulic hoists are adopting 3M Abrasive Belts and 3M Dual Density Contact Wheels. They have found, by actual tests in most cases, that this smooth working combination produces finer finishes at an actual saving in cost. The fast, uniform cutting action of 3M Abrasive Belts and the wide range of scientifically designed 3M Dual Density Contact Wheels enable 3M Sales Engineers to "tailor" this finishing method exactly to the needs of each individual product. 3M Belts, Wheels and Engineering Service all are available through your distributor of 3M Products. Ask him about them or return the coupon below directly to us.

MADE IN THE U.S.A. BY

MINNESOTA MINING & MFG. CO.

THE 3M COMPANY

SAINT PAUL 6, MINNESOTA

MINNESOTA MINING & MFG. CO. FMM1246
Saint Paul 6, Minnesota

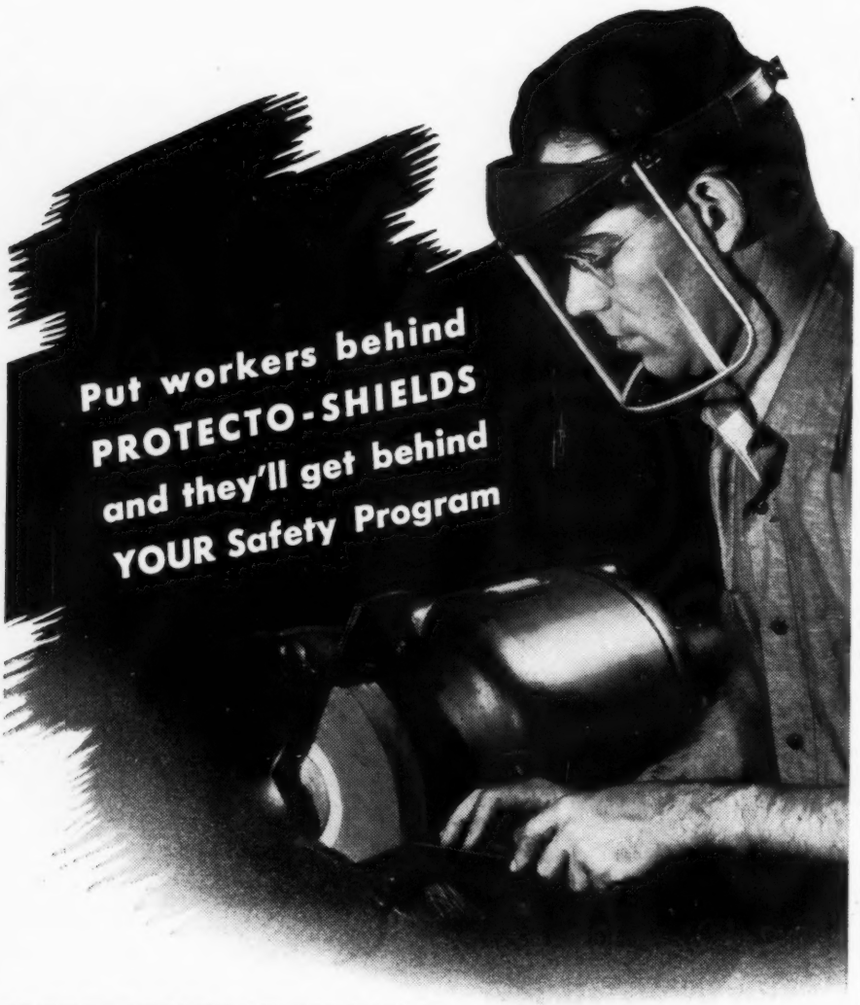
Please have a 3M Sales Engineer call to discuss our grinding and finishing needs.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____



MORE COMFORT MEANS EASIER ENFORCEMENT OF SAFETY REGULATIONS

The more comfort in the eye protection equipment you buy—the more willingness you'll find among workers to cooperate with your eye safety program.

For light grinding, wood working, spot welding and similar light duty operations, Willson Protecto-Shield* gives adequate protection. At the same time, its light weight, its cushioned headband and full visibility permit wearing all day without fatigue.

The visor, with rigid aluminum binding, is made of clear or Willson Tru-Hue green impact resisting plastic. Slot locks hold the visor securely in place and allow easy replacement. The headband is easily adjustable for all head sizes and a tough fibre guard protects the forehead area.

When not in use, the visor tilts up and "stays put."

Protecto-Shield comes in three lengths: 8", 6" and 4". Also available with side wings for protection against chemical splash.

For help with your eye and respiratory protection problems, get in touch with your Willson distributor or write direct.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON PRODUCTS INCORPORATED

Established 1870

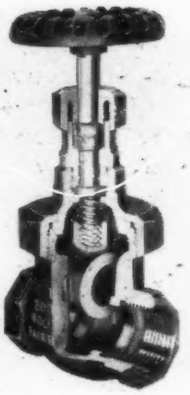
219 WASHINGTON STREET, READING, PA., U. S. A.

*T. M. REG. U. S. PAT. OFF.

it revolves 360 degrees on base with double swivel, friction type lock-up, which fastens from both sides and holds the desired swivel position. Free jaw of the vise moves on a triangular sliding member, on which the 40-deg. angle offers approach to vise from the bottom, and acts to disperse filings, fragments, and weld spatter. Grand Specialties Co., Grand Ave. at Troy St., Chicago 22.

GATE VALVES

Rated for 200-lb. steam pressure, line of union bonnet bronze gate valves includes the rising and non-rising stem types. Supplied with integral seats for



regular service or nickel-alloy seats for severe operating conditions, all valves are fitted with nickel-alloy wedges. Heavy octagonal union bonnet nut holds radial body-bonnet joint in pressure-tight alignment. The Fairbanks Co., 393 Lafayette St., New York.

FIRE EXTINGUISHER

Increased fire-stopping power is one of the advantages claimed for dry chemical fire extinguisher. According to the manufacturer, other features are simple

and fast operation and recharge, heat-shielding protection for the operator, no experience needed to work the unit, and large capacity without increased weight. Fire Extinguisher Div., Ansul Chemical Co., Marinette, Wis.

are waiting to Somewhere...all the time

Employers Mutuals Service helps keep them from happening to you!

EVERY day of the year accidents kill 260 people and seriously injure 28,100 more—at home, at work, on streets and highways. The total cost is well over a million dollars a day.

Tonight hundreds of thousands of men are with their families—men who would not be there except for the outstanding achievements of Employers Mutuals engineering service in reducing accidents and saving lives.

The outstanding reputation of Employers Mutuals for accident prevention began many years ago. Back in 1911, in Wisconsin, a group of farsighted manufacturers decided to share their chances of loss in order to lower the actual cost to each of them. That was the start of Employers Mutuals—the beginning of a story of service.

Because accidents kept the cost of insurance high, they put safety engineers on the job to wipe out the causes of accidents and to devise safer methods of working. Then came industrial nursing, first aid programs, and modern physiotherapy laboratories.

Employers Mutuals service followed the needs of the policyholders. When one needed service in Michigan, Employers Mutuals obtained a charter to operate there. Another policyholder wanted coverage in New York, then in Texas. Again Employers Mutuals went along. Today they are represented in all 48 states.

Large business organizations insure with Employers Mutuals

Thousands of important companies place their insurance with Employers Mutuals because they have made it their business to investigate the sound administration, outstanding service, and reduced accident rates that mean lower insurance costs.

It is equally good business for you to insure with Employers Mutuals

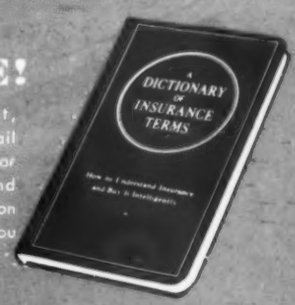
It is sound business for you to enjoy the same advantage of Employers Mutuals safety work, the prevention of accidents—no matter where they may be waiting for you—and the consequent lower insurance costs. Use the coupon to get information about the policies you may need.

How Employers Mutuals Make Insurance Understandable

Employers Mutuals have always endeavored to make insurance understandable, through their representatives, and through the E-M Insurance Survey. Now they are furthering this endeavor through informative advertising and by the publication of "A Dictionary of Insurance Terms—How to Understand Insurance and Buy it Intelligently." This dictionary, with more than 200 definitions, and many specific examples, is yours for the asking.

FREE!

Just fill out, clip, and mail the coupon for your copy, and for information on policies you may need.



Clip and Mail Coupon Today

Check the Coverages in which you are interested

- Automobile ☐
- Burglary ☐
- Comprehensive Protective Policy ☐
- Fidelity Bonds ☐
- Fire ☐
- Extended Coverage ☐
- Group Health, Accident, Hospitalization ☐
- Tornado ☐
- Boiler & Machinery ☐
- Public Liability ☐
- Workmen's Compensation ☐

Others:.....

.....

Insurance Information Bureau,
Employers Mutuals of Wausau,
Wausau, Wisconsin.

Please send me, free, "A Dictionary of Insurance Terms" and information on the insurance checked, for:

☐ Business ☐ Personal protection.

NAME.....

OCCUPATION OR TITLE.....

COMPANY.....

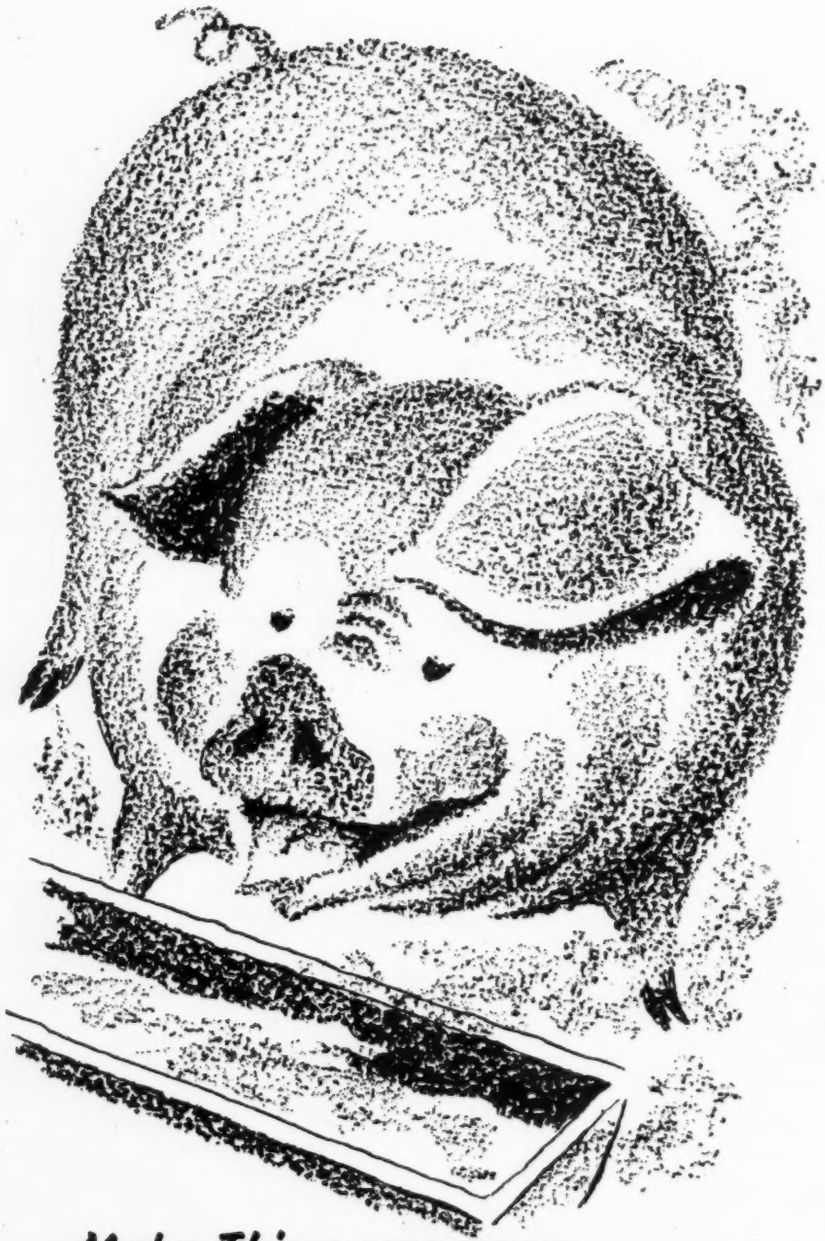
ADDRESS.....

CITY.....STATE.....

Understandable

HOME OFFICE:

WAUSAU, WISCONSIN



Make This DUST HOG *Pay His Own Board*

The majority of users of Pangborn dust control equipment say their systems practically pay for themselves due to reclamation of dust by-products.

Even if your plant's dust is worthless, it pays to keep DUST HOG from devouring profits—interfering with worker efficiency, helping wear out equipment, soiling finished goods, causing accidents.

A free booklet, "Control of Industrial Dust," tells how to eliminate costly "dust pockets". Write PANGBORN, 282 Pangborn Boulevard, Hagerstown, Maryland—*world's largest manufacturer of dust control and blast cleaning equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

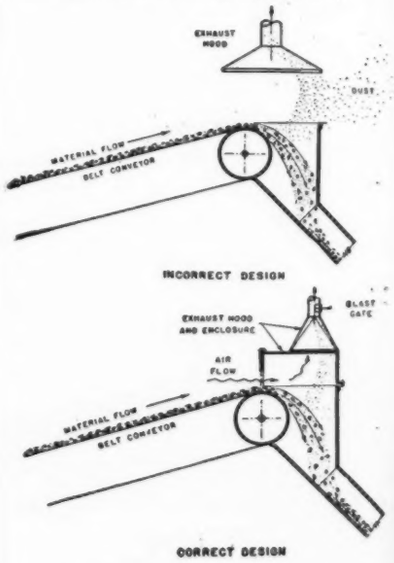
DUST

HOW TO MEASURE DUST CONTROL EFFICIENCY

Amount of dust *collected* is no fair measure of a system's efficiency. The critical factor is the amount of dust allowed to remain *in the air*. The *thoroughness* by which dust is *removed* from the air is the important point—in other words, the amount of dust removed in terms of percentage of dust originally present.

CORRECT AND INCORRECT EXHAUST HOOD DESIGN

These two sketches illustrate a typical example of how an exhaust hood should —and should not—be designed.



CLOTH FILTER METHOD OF DUST COLLECTION

The collector is the heart of the dust control system. The Pangborn "CH" collector consists of a series of cloth-covered screens placed in a grid partition with air space between. As dust-laden air is drawn (or pushed) into the collector it hits a baffle plate, its velocity is retarded, causing the heavier dust to drop into hoppers. The air—carrying the lighter particles—then flows into channels beside the cloth screens, passes through the screens, and deposits the remaining dust on the cloth. The air is now so free of dust it can often be returned to the plant for re-use (saving heat bills in cold weather).

The cloth is cleaned by means of a motor-driven rapping mechanism which operates on the clean side of the cloth, thus beating the dust *outward* rather than into the fabric. There is no direct contact, however, between rapping device and cloth.

The Pangborn "CH" system, with its various modifications, is described further in Bulletin 909A, for which address Pangborn Corporation, 282 Pangborn Boulevard, Hagerstown, Maryland.

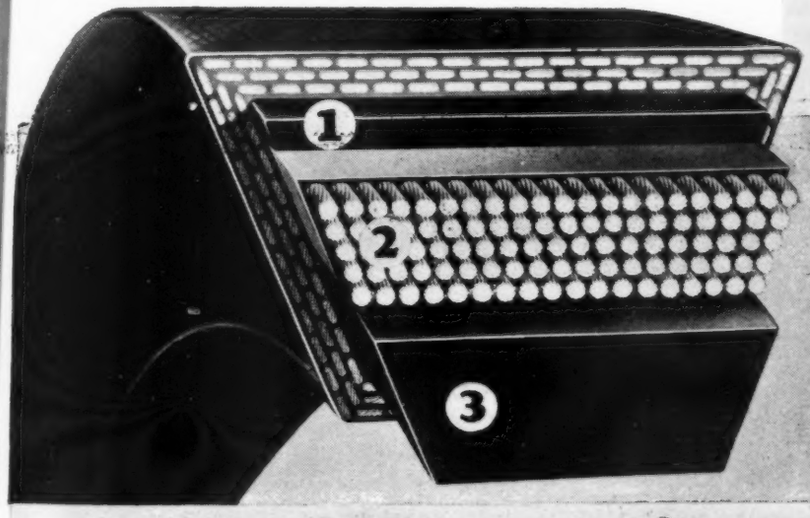
—ADV.

3 reasons why

DAYTON V-BELT DRIVES

Last Longer...Save Machinery...Save Money

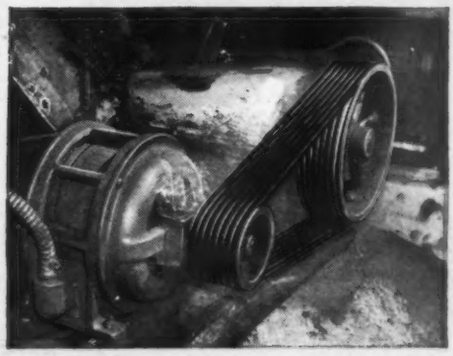
In the cross-section view shown below you can see three reasons why Dayton V-Belts operate efficiently under adverse operating conditions. Under the tough, rugged cover which resists moisture, dust and dirt are three prime sections. In Tension section "1" the live, heat-resistant *specialized* rubber provides the "give" necessary to cooler running. The special cords in Neutral section "2", bonded together to prevent rubbing under pressure, lie straight across the full width of the belt, insuring a true running, balanced belt. In Compression section "3", tough fibre and special synthetics provide great cross-sectional rigidity. Only Dayton V-Belts give you these three big reasons that insure smooth, quiet and economical power transmission under the most exacting conditions. For complete information write The Dayton Rubber Manufacturing Company, Dayton 1, Ohio.



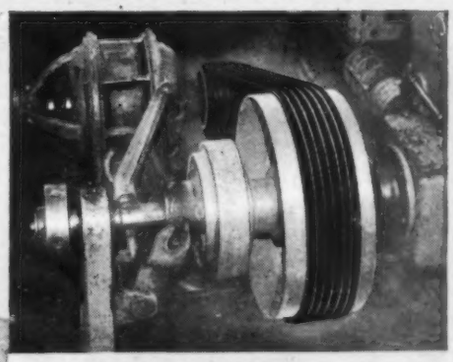
SEND FOR YOUR COPY OF THIS DAYTON CATALOG

With a Dayton No. 280 Catalog you can quickly and easily select the correct V-Belt Drive for any power transmission need. Your copy is free. Write for it today. The Dayton Rubber Manufacturing Company, Dayton 1, Ohio.

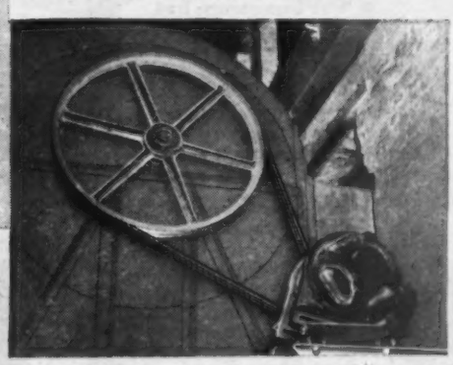
DAYTON V-BELT DRIVES OPERATE EFFICIENTLY UNDER ANY CONDITIONS



DAYTON V-BELTS WITHSTAND COAL DUST — Seven Dayton V-Belts drive this mechanical coal washer, have operated efficiently for seven years despite coal dust in the atmosphere.



DAYTON V-FLAT DRIVE SAVES SPACE, operates more smoothly than former drive on this corrugating machine, and, in addition, made possible the use of the existing large flat pulley.



DAYTON V-BELTS WITHSTAND HUMIDITY, were selected for this drive in a paper mill because of the severe service conditions of hot, humid atmosphere in which they have to operate.

Dayton Rubber

THE MARK OF TECHNICAL EXCELLENCE IN NATURAL AND SYNTHETIC RUBBER

THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

Better food at lunch
More production punch!

● War experience has taught industry that good food, served in the plant increases production. In-plant feeding is even more important now—when top output must meet the challenge of postwar competition.

PIX Engineers have planned and built food service equipment for America's leading factories, as well as small plants with limited budgets. Their wide experience in mass feeding is available to help solve *your* feeding problems, regardless of the amount you want to invest.

Write us your needs and we'll send you illustrations and full information.

IF IT'S FROM PIX IT'S RIGHT

ALBERT PICK CO., INC.
Dept. A, 2159 Pershing Road, Chicago 9
AMERICA'S LEADING FOOD SERVICE EQUIPMENT HOUSE

you want to know

more about the items on this page

Letters to the addresses given will bring you further information.

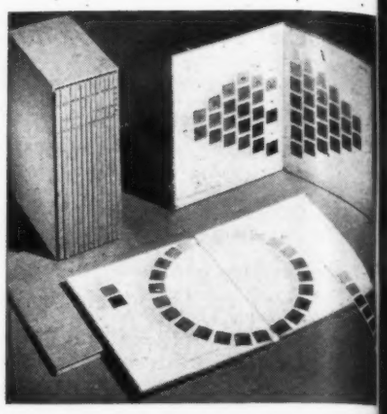
PAPER CARTONS SEALED quickly and at low cost with adhesive that may be sprayed on sections to be bonded. United States Rubber Co., Rockefeller Center, New York.

PENSION PLANS analyzed in new study, "188 Retirement Plans." This booklet shows trends in provisions of plans and preferred types. Bankers Trust Co., New York 15.

INK CONCENTRATE, packed in easy-to-handle dry form, makes a quart of fountain pen ink per small envelope. W. I. Davids & Co., 51 Cliff St., New York 7.

DECONTROLLED COMMODITIES CATALOG, and supplements, alphabetically lists almost 5000 kinds of consumer and capital goods exempted from price control. The Chicago Association of Commerce, 1 North La Salle St., Chicago 2.

METAL ALLOY MIXTURES, offering new commercial uses and advancing developments in powder metallurgy, have been announced. One advantage—machine parts of intricate design can often be made to size and shape without subsequent machining. Chrysler Corp., Amplex Div., Detroit 31.



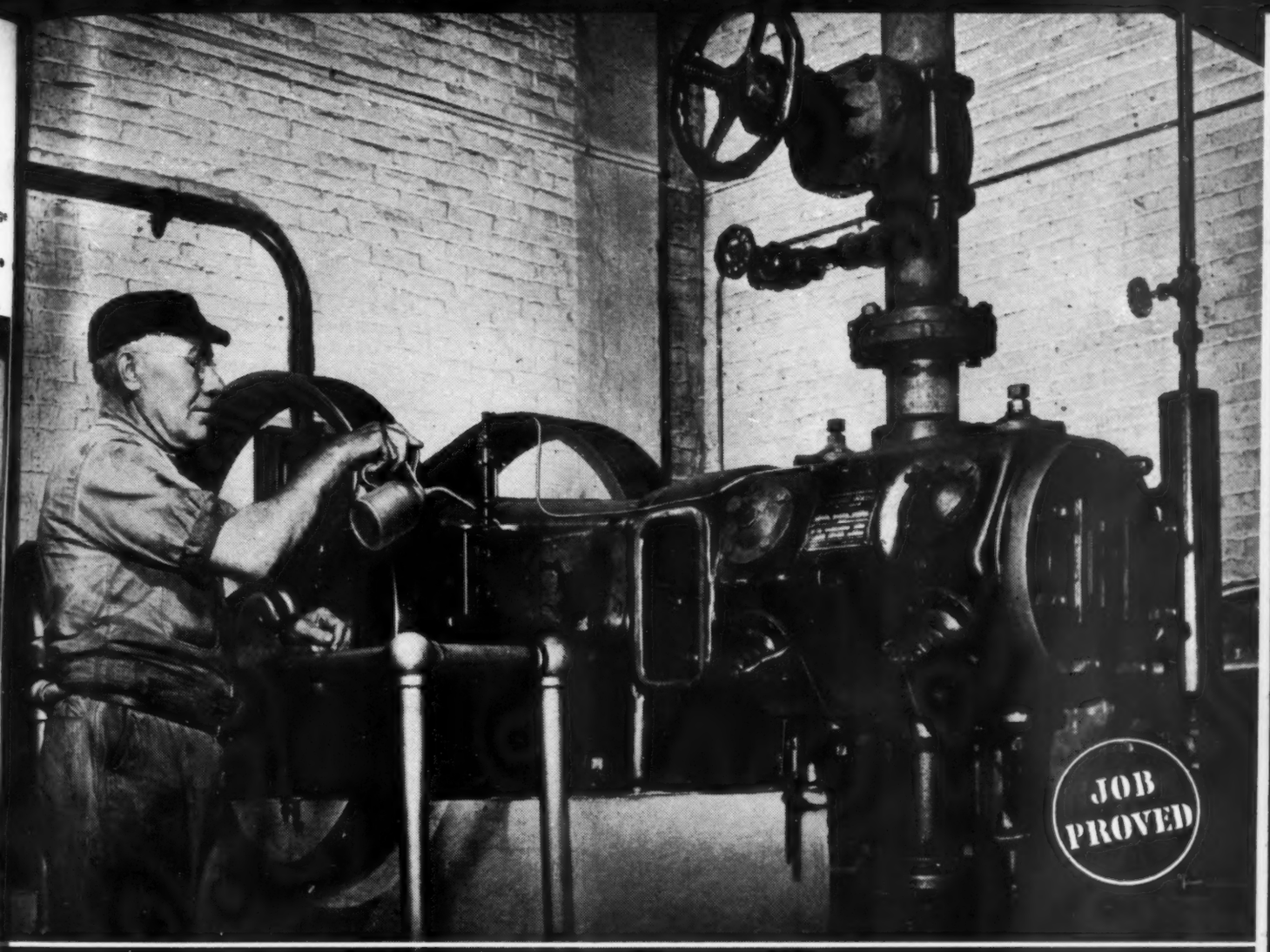
SELECTION OF COLOR harmonies facilitated by color matching set consisting of manuals and movable color chips. Color Laboratories Division, Container Corporation of America, 111 West Washington Street, Chicago

POISON GAS DETECTION provided by colorimetric indicating gel that is said to be 100 times more sensitive than other chemical indicators. National Bureau of Standards, Washington, D. C.

CORRECT TELEPHONING TECHNIQUES that speed calls described in two booklets, "Your Out-Of-Town Call" and "Your Job And Your Telephone." For copies write to the New York Telephone Co., New York.

PLASTIC PACKAGING MATERIAL seals

OPINION METER registers composite vote for subject under discussion in conference group. The instrument, which includes indicator and up to 120 hand-held stations, enables individuals to vote secretly. Apparatus Department, General Electric Company, Schenectady



Saves $2400 ON MAINTENANCE

SUN COMPRESSOR OIL...

Doubles Life of Valves and Rings in 2 Compressors, Ends Frequent Breakdowns Due to Heavy Carbon Deposits

A well-known company recently estimated a saving of $2400 after switching to a Sun oil for lubricating two compressors.

Heavy deposits of carbon on valves and piston rings had made maintenance of these compressors a chronic headache and expense.

A Sun Engineer recommended a "Job-Proved" Sun oil that is specially refined from low-carbon stock and widely used throughout industry for compressors of this type. With this oil the life of valves and rings doubled, and management estimated they had saved $2400 on maintenance alone.

This saving and this plant, which is now 100% lubricated by Sun, are typical of hundreds of cases where Sun Engineers and Sun "Job-Proved" products have helped to eliminate shutdowns, to cut maintenance costs, and to keep production on a continuous basis. Call the nearest Sun office for Sun "Job-Proved" service.

SUN OIL COMPANY · ***Philadelphia 3, Pa.***
Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas

SUN
SUNOCO
INDUSTRIAL PRODUCTS

These *Allen-head* screws are genuine *Allen-made*

Because—they're tied in with the ALLEN HEAD trade-mark which identifies *only* the product of The Allen Manufacturing Company.

Through 36 years of specialization the Allen name has become synonymous with hex-socket screws, so that many buyers accept Allen-*type* screws that are not Allen-*made.* Even buyers who for three decades have purchased "Allens" by name, have also purchased other makes *in the name of* "Allens".

IF all hex-socket screws were as serviceable as "Allens", all would be well in ordering merely the *type.* But if you want or *need* the Allen strength and precision you do need to specify the *make* — and get it.

If you order from your local Allen Distributor, he will see that you are not disappointed by so-called Allen screws that are Allens in type only. Look for the ALLEN HEAD trade-mark on labels and literature — so you'll *find* the quality you expect in the showdown tests.

THE ALLEN MANUFACTURING COMPANY
HARTFORD 1, ★ ALLEN ★ CONNECTICUT, U. S. A.

with hot iron pressure and makes strong liquid-tight containers in any desired size. Bakelite Corp., New York 17.

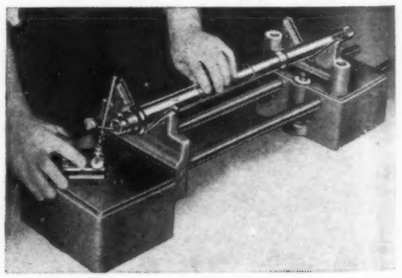
SAFETY CHARTS, size 18x12 inches, deal with 36 subjects relating to the protection of employees. Stanley Tools, New Britain, Conn.

CELLULOSE GUM PRODUCT offers new combinations of properties. It is water-soluble, yet can be made relatively insoluble; it is adhesive but not sticky; it forms a tough film. Industrial possibilities include viscosity control and emulsion stabilization. Hercules Powder Co., Wilmington, Del.

SAFETY SLING COMPUTER determines safe working load for the size of chain being used. It is offered without charge to sling chain users by S. G. Taylor Chain Co., Hammond, Ind.

RUBBER SURFACES MEASURED for roughness by instrument that gages resistance of surface to a stream of compressed air. United States Rubber Co., Rockefeller Center, New York.

LIGHT CONTROL improved for factories and offices with shades made of Vimlite. This material gives privacy but admits more light than the bare window. Easy cleaning is a feature. Celanese Corp. of America, 180 Madison Ave., New York.

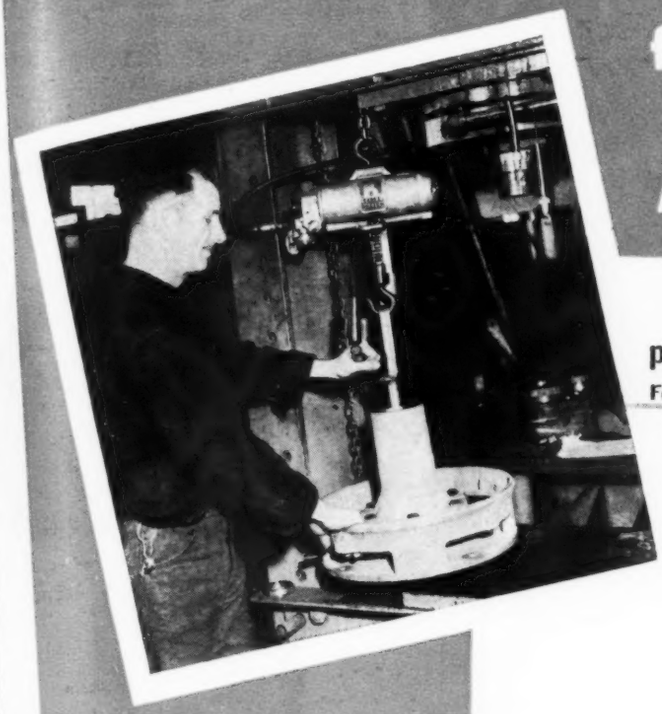


CHECKING CONCENTRICITY simplified by instrument that facilitates determination of relative concentricities on round sections containing various diameters and bores. Swanson Tool & Machine Products, Inc., 814 E. 8th St., Erie, Pa.

PRESS CALCULATOR determines correct press size, capacity for all presses, correct press speed for drawing various metals. Selects correct press size by giving the crankshaft diameter and tonnage, at bottom of stroke, required to do the job. Instruction booklet included. The Calculator Co., P. O. Box 65, Teaneck, N. J.

RESEARCH LABORATORIES LISTED in eighth edition of the directory "Indus-

A picture and a letter speak volumes for KELLER AIR HOISTS



It is gratifying to us when a great company pays tribute to a Keller-engineered tool. The accompanying letter relates what a Keller portable air hoist can be depended upon to do in service. Their power, lightweight, and variable speed features "pay off" in fast-moving assembly lines, foundries, shipping departments, machine shops—in fact, wherever loads have to be lifted and lowered.

Keller Air Hoists now available in capacities of ¼ ton, ½ ton, and the newest size for light loads up to 300 lbs.

Ask for illustrated folder... it fully describes the hoist.

PEERLESS PUMP DIVISION
FOOD MACHINERY CORPORATION

301 WEST AVENUE TWENTY SIX
LOS ANGELES 31, CALIFORNIA

January 11, 1946

Keller Tool Company
Grand Haven, Michigan

Gentlemen:

... The illustration shows one unit in operation facilitating the easy handling of a heavy Peerless Moturbo Housing Assembly where head-space and wall-clearance is quite limited.

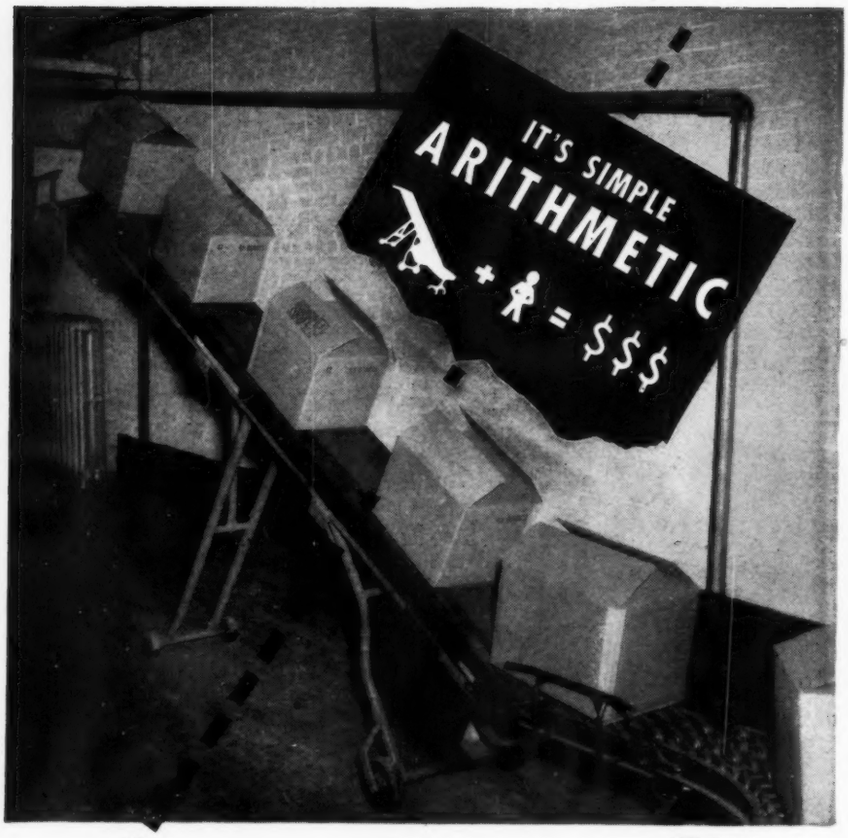
The portability, low hook-to-hook dimensions, and variable speed features make the Keller Air Hoist a utility tool of unusual adaptability on our assembly lines.

Yours very truly,
J. K. Ruscher

J. K. Ruscher

KELLER
Pneumatic Tools

KELLER TOOL COMPANY • 4612 MARTIN STREET • GRAND HAVEN, MICHIGAN



THE *Stevedore, Jr.*

ADDS PROFIT
DIVIDES HANDLING TIME
MULTIPLIES MANPOWER
SUBTRACTS FATIGUE

The Stevedore, Jr. plus one man = increased production and more profits.

This combination of a Stevedore, Jr. and one or two men does the work of ten men in less handling time and with less fatigue.

Useful in loading — or unloading — trucks and cars . . . in low stacking operations . . . in a gravity conveyor line as a "booster" or "pusher."

The Stevedore, Jr. — portable, power belt conveyor . . . easily moved from one job to another.

. . . Adjustable Rapid-Lock Supports — from 18" horizontal level to 72" delivery height.

. . . Will lift 225 lbs. of distributed load weight at the rate of 50' per minute.

. . . Plugs into standard 110-volt lighting circuit.

IT COSTS NOTHING TO GET FULL PARTICULARS
WRITE TODAY FOR FREE LITERATURE

OFFICES IN PRINCIPAL CITIES

Manufacturers of
STEEL FORGED CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

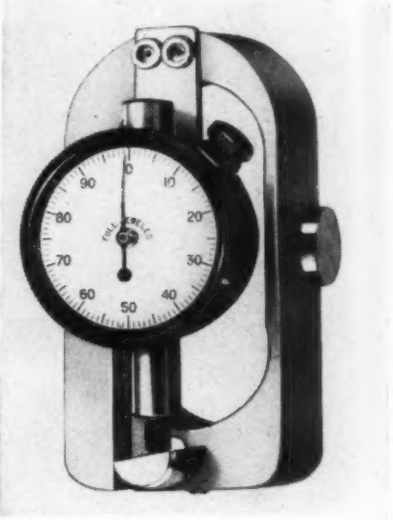
The Rapids-Standard Co., Inc.

Sales Division—370 Peoples National Bank Bldg., Grand Rapids 2, Mich.

trial Research Laboratories of the United States." National Research Council, 2101 Constitution Ave., Washington 25.

SOOT REMOVED from oil- or coal-fired industrial boilers by chemical agent that lowers ignition point of soot, permitting it to burn. O'Brien Industries, Bala-Cynwyd, Pa.

AVAILABLE ENEMY PATENTS listed in book summarizing all the seized mechanical and electrical patents of enemy nationals. Office of Alien Property, Department of Justice, Washington 25.



MECHANICAL PRESSURE GAGE, compact and lightweight, is designed for versatile use in measuring working loads, such as pressure between moving rollers. W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44

FILMS

This is TB, both 16 mm. and 35 mm., describes tuberculosis, its causes, prevention, and cure. National Tuberculosis Association, 1790 Broadway, New York.

To Live in Darkness, 16 mm., is a dramatic safety film about eye injuries caused when use of safety goggles is neglected. Castle Films, 30 Rockefeller Plaza, New York.

Treasure From the Sea, a Walt Disney Technicolor film sponsored by The Dow Chemical Co., tells the story of magnesium and outlines possibilities for future consumer and industrial use. Distribution is through The Princeton Film Center, Princeton, N. J.

SOUND SLIDE-FILMS

Phonetiquette trains employees in the handling of incoming telephone orders. General Motors Corp., 3044 West Grand Blvd., Detroit 2.

Healthy, Wealthy, and Wise, 35-mm. filmstrip with 16-in. recording, illustrates with cartoon story the benefits of group health insurance. Brandon Films, Inc., 1600 Broadway, New York 19.

*Patented Process

From any angle . . .

THE IDEAL REFLECTOR MATERIAL!

This is a specially selected sheet of Alcoa Aluminum. The miracle of it, as far as a lighting man is concerned, is that you can make about any type reflector you want of it. All of them will be about the best of their type you can get.

With the highly efficient Alzak*-finished Aluminum reflecting surface already a part of the metal, it may be bent and shaped without damage to the tough, protective oxide coating. Or the Alzak finish may be put on after you have drawn or spun the sheet.

High efficiency results from such reflectors, for fluorescent, incandescent, or radiant application.

The exterior surface may be polished, or etched, or in iridescent color.

The reflecting surface may be either specular or diffuse.

You'll find it more efficient, longer lasting, tougher, less affected by the hazards that reflectors are exposed to, than any reflecting surface you can get. ALUMINUM COMPANY OF AMERICA, 1941 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in principal cities.

ALCOA FIRST IN **ALUMINUM**

IN EVERY COMMERCIAL FORM

Cleanse Thoroughly!

. . . depend on the 35 year industrial hygiene record of America's No. 1 hand soaps by Lightfoot. The secret of their speedier, more thorough cleansing is INTEGRATION . . . an exclusive process resulting in perfect uniformity of texture and mixture, in which *each individual particle* is a *complete* cleanser in itself.

Gently! Safely!

. . . prevent red, raw, defatted skin — keep vital hands in top condition. The secret of Lightfoot's gentleness and SAFETY is quality ingredients, a low pH index and the "know-how" of more than three decades of quality soapmaking.

with Lightfoot Industrial HAND CLEANSERS

Approved . . . BY LEADING PLANT MEDICAL AND SAFETY DEPARTMENTS

Write for samples, or assistance on specific cleansing problems . . . no obligation, of course!

LIGHTFOOT SCHULTZ COMPANY

NEW YORK: 663 Fifth Avenue
CHICAGO: 43 East Ohio Street

SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Lecturer in Government Regulations, New York University, and a Member of the New York Bar

Period Surveyed: October 1 to November 1

TREND INDICATORS

Veterans

QUALIFICATION FOR JOB

A federal district court ruled that an employer is not the judge of a veteran's physical ability to qualify for reinstatement to his old job. The veteran applied for reinstatement in his former job as member of the police force. The Police Commission's physician, after giving the veteran a physical examination, testified that he had a heart murmur and was thus disqualified from his former job. The court, relying on the testimony of the Army physician who examined him at the time of his discharge and that of two heart specialists, all of whom stated that the veteran had no heart ailment, ordered his reinstatement. The court reasoned that the purpose of Congress in passing the reemployment provisions of the Act would be defeated if the determination of the former employer with respect to physical condition, changed circumstances, and so forth, were to be final and binding. (Parilla v. Velarde, USDC PR)

SENIORITY SYSTEM DETERMINES VETERAN'S STATUS

Where there was no seniority system in effect at the time the veteran entered the armed forces, a returned veteran was deemed by a federal district court to have no right to displace another veteran who was hired after the effective date of the seniority agreement. Since this agreement, entered into after the veteran's entrance in the service, did not provide for retroactive seniority, the court declared that the veteran's right to seniority did not exist. Although, under the U. S. Supreme Court's ruling that a veteran is entitled to be restored to the "seniority escalator" at the status he would have reached had his work not been interrupted, such is the case only where a seniority system was in existence before the veteran's induction. (Thompson v. Lyons Transportation Company, USDC W.N.Y.)

PROMOTION DENIED

Upon reinstatement, a veteran was rightfully denied a promotion to foreman which he claimed was due him on the basis of seniority. After examining the facts of the case, the court found that the established custom, embodied in the contract between the company and the union, was to determine the qualifications of foremen and appoint such person who, in the company's opinion, was the most qualified to perform those duties. The seniority of the employee was considered if, in the company's opinion, the employee with the greatest seniority was equally or better qualified than any other employee to perform the duties involved. Since seniority, however, was not in itself the controlling factor, the court held that the employer fulfilled his statutory obligation by reinstating the veteran to his former position with the increase in the rate of pay now prevailing for that position. (Orban v. The Reynolds Metals Company, USDC N.J.)

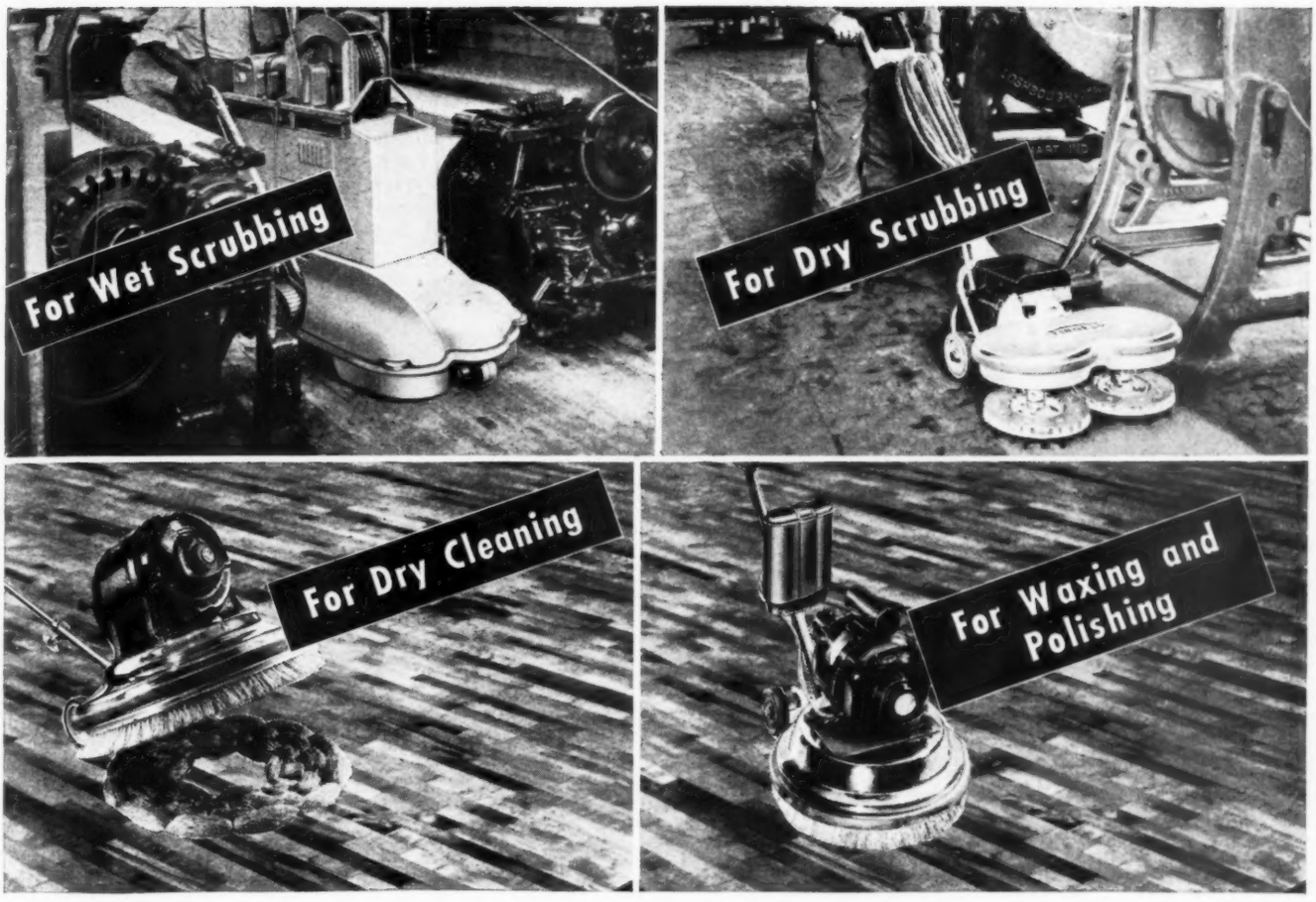
INCREASED SALARY ORDERED

Not only were reinstatement rights to his former job awarded to a returned veteran as general manager of a car-card advertising business, but the court also ordered the employer to double his salary so that the veteran would receive $600 a month, the salary currently being paid to the present incumbent of the job. The employer refused to reinstate the veteran in his former position on the ground that its operations had increased beyond the ability and experience of the veteran to serve in his former capacity and with his former authority. Because the company wanted to retain the present general manager, it offered the veteran a job of limited, inferior duties and authority, at a salary at less than $600 a month.

Before his induction, the veteran executed, directed, and had charge of all the company's affairs under the general direction of the board of directors, carried out all company policies, had the right to hire, fire, fix terms of employment, and performed other administrative functions.

The court found that the veteran was still qualified to perform these duties, and moreover, it held that the increase of business that took place under the management of the veteran's successor (the present incumbent of the job) did not so change the employer's circumstances as to make it unreasonable or impossible for it to reemploy the veteran and restore him to that position.

The court pointed out that the word "position," as used in the reemployment



There's *A Job-Fitted Finnell* FOR EVERY TYPE OF FLOOR CARE

In the interest of safety and sanitation, floor-preservation and economical maintenance, some floors require *wet scrubbing*. In mills and factories, for example, *wet scrubbing* with a mineral oil solvent affords the most effectual means of quickly and safely removing grimy oil and grease. But in machine shops, where grimy oil and grease mix with shavings and form heavy coatings on the floors, speedy removal of the embedded accumulations calls for heavy duty *dry scrubbing*. Floors that are best maintained by waxing are *dry cleaned and polished* in a single operation by the labor-saving method of steel-wooling.

Different floors and conditions call for different methods and equipment for adequate floor care. That's why *Finnell* makes *more than a score* of floor-maintenance machines and supplies several of their models in a wide range of sizes. From the complete *Finnell* line, it is possible to choose *job-fitted* equipment! *A Job-Fitted Finnell* provides the greatest brush coverage consistent with the area and arrangement of the floors—whether the job calls for wet scrubbing, dry scrubbing, or dry cleaning... or for waxing or polishing.

***Finnell* also makes a full line of *Cleansers, Sealers,* and *Waxes,* as well as *Steel-Wool Pads, Mop Trucks,* and other accessory equipment. For consultation, free floor survey, or literature, phone or write nearest *Finnell* branch or Finnell System, Inc., 2512 East Street, Elkhart, Indiana. Canadian Office: Ottawa, Ontario.**

FINNELL SYSTEM, INC.

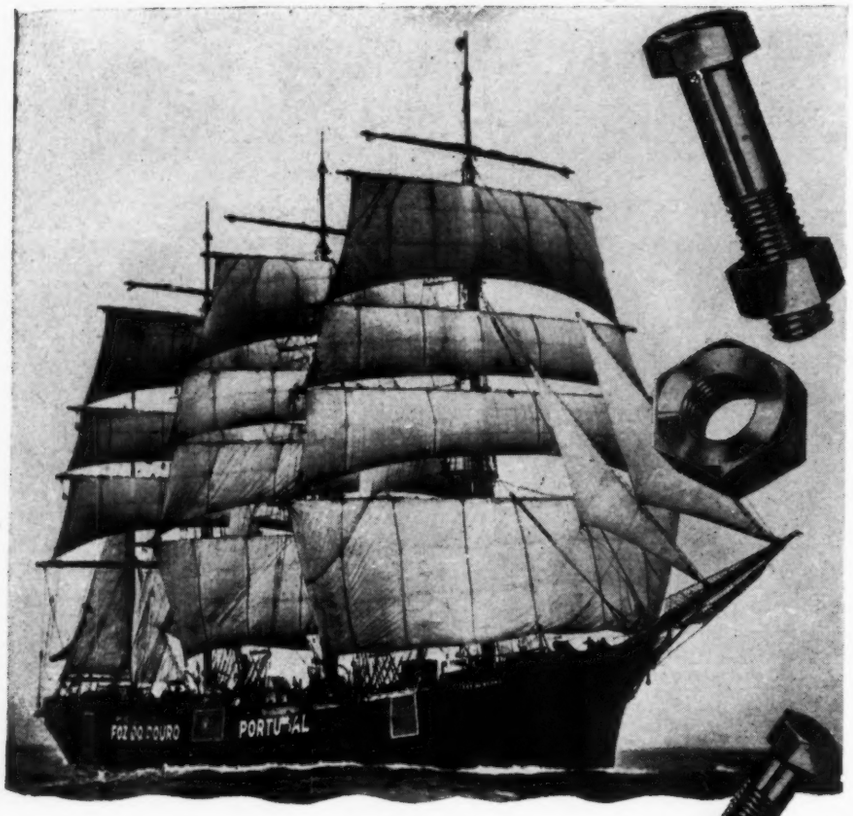
Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

A Windjammer *Goes Modern*

WITH DIESELS AND BRONZE BOLTS



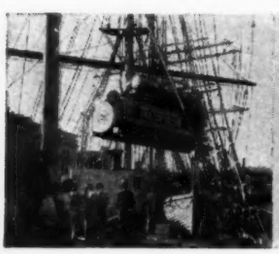
WHEN the glorious old sailing vessel "Foz Do Douro" recently made a record crossing from Lisbon to Vera Cruz, she did it with twin 650 hp. Fairbanks-Morse Marine Diesels in her new engine room . . . at the mercy of the wind no longer.

Her FM diesels, too, were protected against rust and corrosion the *modern way*—by Harper Bronze Bolts . . . long-lasting and easily removable . . . in clutches and circulating pumps.

This study in contrasts between the old and the new may be a cue to a similar application in your industry. Wherever there is danger of rust or corrosion consult a Harper engineer. The original installation of non-rusting, non-corroding fastenings pays for itself many times in reduced maintenance and elimination of breakdown.

THE H. M. HARPER COMPANY
2651 Fletcher Street, Chicago 18, Illinois
Branch Offices: New York City, Philadelphia, Los Angeles, Milwaukee, Cincinnati, Dallas.
Representatives in principal cities

BRASS
BRONZE
COPPER
STAINLESS
MONEL



One of the twin 650Hp. Fairbanks-Morse Marine Diesels . . . equipped with Harper Bronze Bolts . . . goes into the new engine room of the 54 year old sailing vessel.

HARPER
Everlasting Fastenings
Chicago

provisions, denotes not merely employment as such, but also a status in relation to other workers employed by the same firm. Since there had been a general increase in the rate of pay received by all employees of the company, as well as an increase in the monetary value of the duties performed by the general manager, it would be unreasonable, considering the salaries now being paid inferior employees, that the veteran should be compelled to accept reemployment in his former position at no greater salary than he received before his induction. The salary previously paid the veteran is about equal to that now received by the lowest paid salesman in the company's employ. Finding that the salary being paid to the present general manager was in line with the salaries of other employees of the company, the court held it to be a part of the position to which the veteran was entitled under the statute to be restored. (Parker v. Boyce, Inc., USDC S. Calif.)

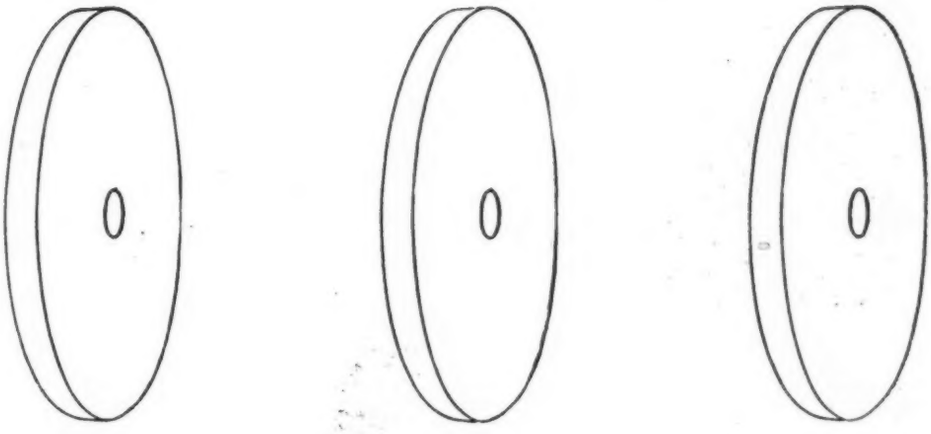
AMOUNT OF BACK PAY

Declaring that five days is a reasonable period within which the employer should reinstate a veteran making application therefor, a federal district court awarded a veteran back pay dating from five days after his application to the date of reinstatement. (Donaldson v. Tennessee Coal Company, USDC N. Ala.)

A back pay award granted a veteran who had been illegally denied reinstatement was whittled down by a federal district court. The court allowed the employer to deduct from the amount due as back pay (1) the amount the veteran would have received as pay for a four-week period during which a strike was in effect, (2) the amount the veteran received as unemployment insurance, and (3) the amount the veteran earned in other work during the period he was refused reinstatement. (Hopper v. Republic Steel Corporation, USDC N. Ala.)

BACK PAY NOT BARRED BY STATUTE OF LIMITATIONS

In determining whether a veteran could bring suit against his former employer for back overtime and liquidated damages due him under the Wage-Hour Law in a state which had a statute of limitations in effect, a federal district court declared that the period the veteran spent in the armed forces was not to be counted against the time within which the claim could be brought. The court based its decision on the provision of the Soldiers' and Sailors' Relief Act of 1940 which reads as follows: "The period of military service shall not be included in computing any period now or hereafter to be limited by any law for the bringing of any action by or against any person in military service or by or against his heirs, executors, administrators, or assigns, whether such cause of action shall have accrued prior to or



C-GRADE H-GRADE R-GRADE

There's more to grinding grades than the A, B, C's

The A, B, C's which appear as identification on a grinding wheel help simplify proper grade selection. By clearly showing relative hardness, they make your choice quicker, easier...aid in assuring the right grade for the job. That's one reason wheels by CARBORUNDUM are plainly marked. But, there's more to it than the old chestnut, "the softer the metal, the harder the wheel." It's not that easy.

You realize, for instance, that wheel speed itself affects grinding action. The same grade reacts differently at various speeds. The condition of the machine and the amount of vibration can make a difference. Desired finish...required tolerance must be considered. Coolant conditions vary. The actual type of operation—snagging, surfacing, internal grinding or whatever it is—influences practical selection.

Yes—there are many important factors to check before you can be sure of the right grade designation for the job.

That's why we suggest consulting your CARBORUNDUM salesman or our distributor's representative. These men work throughout the year on a wide variety of grinding problems. They are familiar with grinding in production... in tool rooms...wherever it is used. They have practical knowledge and experience to help you pick exactly the wheel you need for the job.

Assisting these representatives in the field are our Abrasive Engineers. Specialized experts, they are equipped to analyze uncommon problems...recommend sound solutions. And, here in our modern laboratories are scientists and technicians who are working on the application of abrasive developments to changing grinding practices.

This *three way route* to better grinding is easy to use. No obligations are incurred. Merely talk "grinding" with a CARBORUNDUM representative. He'll be glad to assist you. The Carborundum Company, Niagara Falls, N. Y.

A good rule for good grinding... **CALL IN**

CARBORUNDUM

TRADE | MARK

ABRASIVE WHEELS

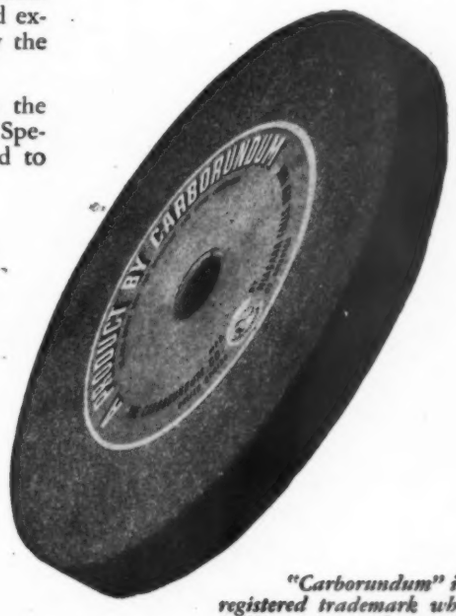
Silicon Carbide
Aluminum Oxide
Diamond

COATED AND BONDED ABRASIVES

Paper and Cloth Combinations
Sheets, Rolls, Discs
Cylinder Hones
Sticks, Stones & Rubs
Specialties

ABRASIVE GRAINS AND COMPOUNDS

for:
Polishing
Lapping
Pressure Blasting
Finishing



"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

AJAX
FLEXIBLE
COUPLINGS
Ajax design permits installation vertically or at any angle. No lubrication. Remember that all the horsepower goes through the coupling...put it up to Ajax.
AJAX FLEXIBLE COUPLING CO. INC., WESTFIELD, N. Y.

during the period of such service." This provision, the court reasoned, protected the veteran's right to recover back wages for the entire period before his induction. (Hayes v. Cuneo Printing Industries, USDC N.Ill.)

WAGE-HOUR REGULATIONS

WHO MAY BRING ACTION FOR BACK PAY

The provision of the Wage-Hour Law which states that an action to recover wages "may be maintained . . . by any one or more employees for . . . themselves and other employees similarly situated" was held by a federal district court to include all other similarly situated employees who choose to come into the case, but does not perforce include all. The employer had contested the constitutionality of the provision on the grounds that it might compel an employee to become a party to an action against his will, and preclude any subsequent recovery possible if the initiating employee failed in his action, and it might compel an employee to be represented by an attorney not of his own choosing. Because the action is not all inclusive, but merely permissive, the court upheld the provision's constitutionality since only those who choose to enter into the action need do so. (Wright v. U. S. Rubber Company, USDC Ia.)

LIMITATION ON BACK PAY UPHELD

A federal district court upheld the constitutionality of the three-year limitation set by a Maryland statute on recovery of back wages under the Wage-Hour Law. Employees contested the statute as being discriminative against federal legislation and in favor of state legislation, thus rendering the statute unconstitutional. The closest analogy the court found was the common law liability of an employer for wages due an employee. The court also found that the Maryland statute would apply the same period of limitations to an ordinary suit by an employee for wages due. The fact that the Act makes specific reference to suits under the Federal Act, the court deemed insufficient to invalidate the provision. (Warnich v. Bethlehem—Fairfield Shipyards, Inc., USDC Md.)

NO CREDIT FOR OVERTIME

An employer may not credit amounts paid in excess of overtime required by the Wage-Hour Act in some workweeks against payments in other weeks which did not satisfy the Act's requirements. Nor may he count amounts paid as regular year-end bonuses in determining the overtime compensation due the employees. The court declared that the employer could not reduce his liability by either one of these methods. The

SIMONDS
SAW AND STEEL CO.

Makes Only One Quality . . . the Finest . . . in:

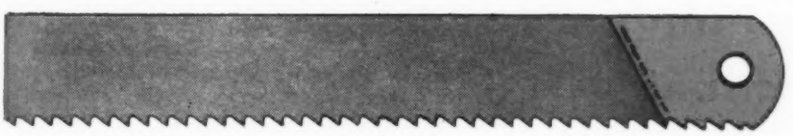
SAWS *and* FILES

"RED END" Hand Hacksaw Blades: Molybdenum, all hard, and hard edge.

"RED END" Hand Hacksaw Blades: High-speed steel. All hard, and hard edge.

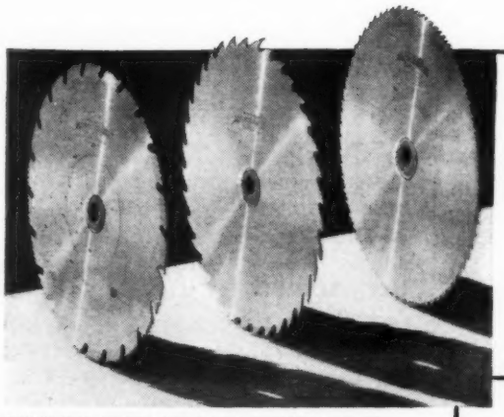
"RED END" Hand Hacksaw Blades: Standard steel. All hard, and hard edge.

"RED END" Power Blades: Molybdenum.

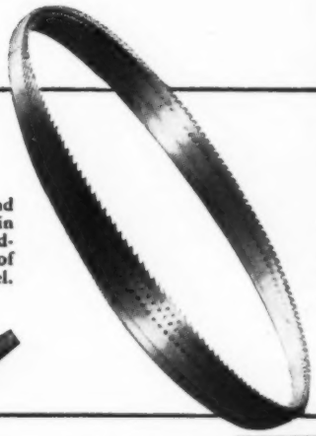


"RED END" Power Blades: High-speed steel.

SIMONDS Crosscut Saws: "Crescent-Ground" saws are the finest made . . . of special Simonds steel, ground front and back by exclusive process, for uniform taper, so saws don't choke or bind. 2-man and 1-man saws.



SIMONDS "RED STREAK" Solid-Tooth Circular Saws are made in many types . . . rip, planer, cut-off, etc. . . . for every type of wood-cutting job. Smoother cutting, longer lived



SIMONDS Narrow Band Saws are widely used in planing mills and woodworking plants. Made of Simonds special alloy steel.

SIMONDS "RED TANG" Files: First quality only. Made with teeth like Simonds Metal Saws ...to cut instead of scrape.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS STEEL MILLS — *Special Electric Furnace Steels*
SIMONDS ABRASIVE CO. — *Grinding Wheels and Grains*
SIMONDS — *Simonds Products for Canada*

Reduce Costs! Avoid Injuries! Increase Production!

WELDISKS grind better because they lie flat . . . do not soften up . . . do not curl or warp.

WELDISKS last longer, thereby reducing costs, because, unlike ordinary disks, their amazing cold-setting cement (a scientific formula – not glue or resin) actually improves with age!

WELDISKS avoid breakage and injuries to operators because of their laminated backing of fibre for stiffness plus cloth for strength.

WELDISKS are better disks. Prove it to yourself! Make your next grinding disk order specify WELDISKS – see how this safer disk cuts faster and lasts longer.

Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS · MAKERS OF JEWEL COATED ABRASIVES

LABOR DEVELOPMENTS *(continued)*

Act does not permit the averaging of either hours worked or overtime pay over two or more weeks except in the case of the prepayment plan, where the employer pays the overtime in advance as a credit against overtime to be worked in another week of the same pay period. (Black v. Roland Electrical Company, USDC Md.)

HELD UNDER THE ACT

Employees working in the coal and stokers business of a fuel company, since the Administrator proved that the coal and stokers handled by the employees were obtained from outside the state, were stored temporarily by the company, and were sold to local customers, some of whom were engaged in the production of goods for interstate commerce. The company's contention that it was exempt from the Act as a retail establishment was rejected by the court since the company could not prove that less than 25 per cent of its business was nonretail in nature. (Walling v. Northwestern—Hanna Fuel Company, USDC Minn.)

Work including wheeling and unloading freight, building new vehicle bodies, repairing badly damaged bodies, and painting and lettering of trucks, since such work does not directly affect the safety of operations. (Walling v. Silver Fleet Motor Express, USDC W. Ky.)

HELD NOT UNDER THE ACT

Timekeeper hired by contractors engaged in the construction of various government projects in Alaska. The timekeeper argued that he was engaged in interstate commerce through his close connection with the employees, especially truck drivers, who move the materials used in the construction work from the United States to the construction site. The court, however, found that the timekeeper failed to prove that a substantial portion of his time was spent in handling and transporting goods, that the truck drivers themselves were engaged in interstate commerce, and that the goods moved by the truck drivers were still in the stream of commerce while being transported by them. (Maitrejean v. Metcalfe Construction Company, USDC Minn.)

HELD EXEMPT

Declared employees of the railway and not employees of the company supervising the dining car service, dining car workers were deemed exempt from the overtime provisions of the Wage-Hour Law. The court considered them employees of the railway on the ground that the railroad controlled and directed them, had the right to discharge them, determined the pricing policy of the dining service, and bore the loss of such service. (Allen v. Fred Harvey Service, USDC N. Ill.)

Drivers, drivers' helpers, loaders, checkers, and mechanics who perform

They're NEW...

4 "HOW-TO-DO-IT" FILMS BY ALCOA

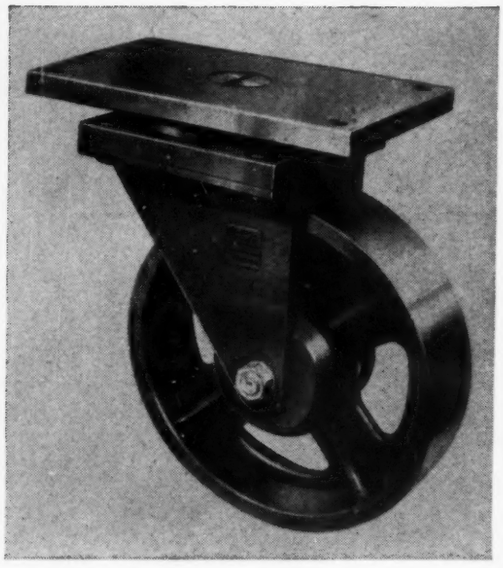
Bring your workers up to date on these four methods of joining Alcoa Aluminum. These new films are available for both 16 mm. and 35 mm. sound motion picture projectors. May be borrowed or purchased.

Call the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 2126 Gulf Building, Pittsburgh 19, Penna.

ALCOA FIRST IN ALUMINUM

IN EVERY COMMERCIAL FORM

DARNELL
CASTERS & WHEELS



• Save Money, Floors, Equipment and Time by using DARNELL Casters and Wheels . . . Always dependable,

Free MANUAL

DARNELL CORP. LTD.
LONG BEACH 4, CALIFORNIA
60 WALKER ST. NEW YORK 13, N.Y.
36 N. CLINTON CHICAGO 6, ILL.

work on motor vehicles, since they devote a substantial part of their time during the workweek to activities which affect the safety of operation of vehicles. (Walling v. Huber & Huber Motor Express, USDC W. Ky.)

RECONVERSION CONTROLS

*INCREASE IN ONE INDUSTRY HELD NOT APPLICABLE TO ANOTHER

The employees engaged in the rubber heel production of a shoe company were denied a general increase requested on the basis of a pattern increase obtained in the entire rubber industry. The union representing the employees maintained that the plant producing the rubber component to be used in the course of shoe production was part of the rubber industry and therefore entitled to the increase. The company, on the other hand, contended that the plant was not part of the rubber industry, but rather an integral part of its shoe manufacturing business, and thus a part of the shoe industry. It also maintained that a wage settlement made in November, 1945, was final and binding during the term of the agreement, subject only to the wage-reopening clause of the contract which provides that wages may be reopened on a showing that changes in the company's competitive or economic position justify a different level of wages. The union made no charge that this reopening clause was applicable to its demand.

The arbitrator found that traditionally the process of manufacturing rubber soles and heels has been considered as part of the company's business, which is manufacturing shoes. Thus, no valid reason exists for finding that this operation should be considered otherwise than as a part of the shoe industry and the pattern increase made in the rubber industry would not be applicable.

Nor does the wage settlement reached in November, 1945, entitle the union to open the agreement on the question of a general wage increase before its expiration date. The union advanced no reason on which to base a reopening of the contract in conformity with the provisions of the contract. As stated by the arbitrator, "the respective rights of parties became fixed for the duration of the agreement as to all points." (In re arbitration between International Shoe Company and United Rubber Corporation, Linoleum & Plastic Workers of America)

*EMPLOYER PENALIZED FOR PAY DECREASE

The Wage Stabilization Board recently penalized an employer because he reduced the wage rates of the union's grievance committeemen. The Board had originally approved the employer's request to pay premium rates to the union

* In this and the following classifications, items marked with an asterisk also are considered to be trend indicators.

Air Grinders BY ARO

- ✔ POWERFUL
- ✔ LIGHTWEIGHT
- ✔ STALLPROOF

ARO offers a complete range of Air Grinders for all types of work—from fine finish burring and polishing in tool rooms...to heavy duty production grinding. A 2" heavy duty grinder is shown above.

Switch to ARO Air Tools all along your production lines—for grinding, polishing, drilling, screw-driving, nut-setting, sanding, filing, and other jobs. Save time—cut costs—improve quality. Precision-built... dependable. Write for literature. The Aro Equipment Corporation, Bryan, Ohio.

NEED TOOLS NOW? **SEE YOUR ARO JOBBER!**

BLINDFOLDED

it's easy to pick the right wiper!

Try the blindfold test on KEX Industrial Wiping Towels and ordinary rags or waste. Just by touch, choose the wiper *you* would use.

Feel how rough and scratchy the ordinary rags and waste are. What a lot of damage *they'd* do on delicate surfaces! Now pick up a KEX Wiping Towel. Easy to tell the difference, isn't it? Feel that springy KEX s-o-f-t-n-e-s-s. No scratching, no possibility of wearing grooves in soft metal by foreign matter.

That's not all, though. Every square inch of a KEX Wiping Towel is *wiping* surface . . . hundreds of more wipes per pound over ordinary waste or rags. KEX Industrial Wiping Towels are uniform in size—distribution is easier to control. And fresh KEX Wiping Towels—chemically cleaned by a *special* high-heat process—are delivered to your plant as often as needed. Always plenty of clean KEX Wiping Towels on hand.

Rent KEX Wiping Towels and Figure Your Profits

Try the KEX Wiping Towel Rental System, today. There's nothing to buy, no expensive inventory—just a low monthly rental. And the very first month should show considerable saving on wiping costs. For complete information, phone your local KEX representative—or write KEX National Service, 295 Fifth Ave., New York 16, N.Y.

"KEX" NATIONAL SERVICE
REG. U.S. PAT. OFF.
"KEX" REG. U.S. PAT. OFF. NATIONAL SERVICE A CALLAWAY MILLS PRODUCT INDUSTRIAL WIPING CLOTHS

representatives for time spent in handling grievances and for time spent on their jobs. Such rate was set as the highest rate paid in the department, plant, or division for production work.

Subsequent to a wildcat strike, in violation of the contract, the employer reduced the rates paid to the union representatives to the rates regularly paid for the work they performed, but still continued to pay them for time spent on grievances. The Board held that such reduction was in contravention of stabilization regulations, since it had not been approved. For this reason, the Board upheld an $8,000 assessment as a tax disallowance penalty for the unauthorized reduction in the rates.

The dissenting opinion pointed out that the Board was penalizing the employer for discontinuing financial assistance to the union, an act which is forbidden by the Wagner Act. The majority opinion countered by pointing out that financial assistance to unions had been deemed illegal only where the union was found to be company-dominated, and that in this case no finding of domination was made. Furthermore, it pointed out, the Wagner Act specifically permits the payment of regular wages to workers while conferring on grievances. (Kelsey-Hayes Wheel Company, WSB)

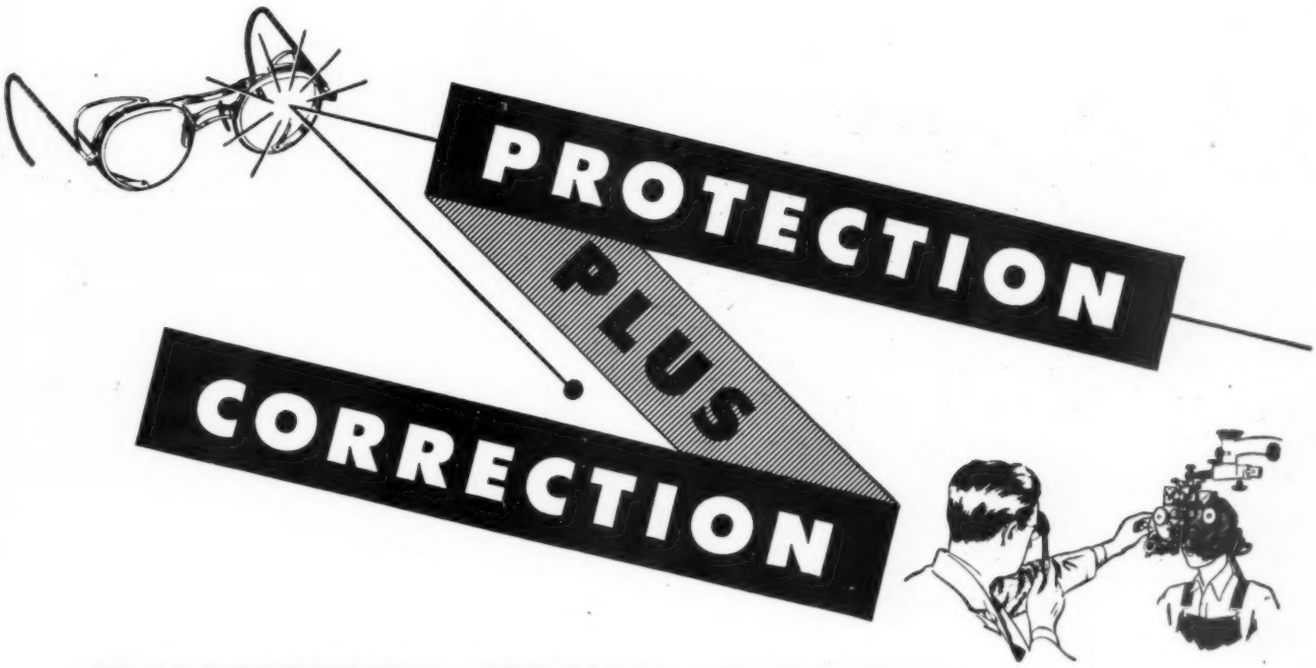
*DECREASE PERMITTED

Where the take-home pay of the employees would not be reduced, the WSB permitted an employer to decrease the straight-time hourly rate upon the institution of payment of premium rates for overtime. Where the employees had previously been paid straight-time rates for all hours of a 44-hour week, they were now to receive the reduced hourly rates for the first 40 hours worked, and time and one-half for the hours worked in excess of 40 a week. As the plan worked out, the employees' take-home pay proved to be in excess of that which they received under the former plan. To make sure, however, that no reduction in take-home pay would result, the Board required the employer to pay the weekly earning on the basis of the overtime workweek, regardless of the number of hours actually worked. The Board stated that it was not responsible for the plan's validity under the Wage-Hour Law. (People's Gas Company, WSB)

NATIONAL LABOR RELATIONS BOARD

*APPROPRIATE UNIT

Where the Board found that the inspectors of finished products were not managerial, confidential, or supervisory employees, it held that they may be properly included in a unit of production and maintenance employees. Although their duties included determinations as to quality of the products, the Board found that they had no authority to hire, discharge, or effectively recommend a



SAFETY TWO WAYS

● Your safety eyewear program is designed to reduce accident frequency by *protecting* workers' eyes against flying particles, glare, fumes, and dust. But eyesight *correction* added to protection is an important safety measure, too. Sharp vision is safe vision. Your Bausch & Lomb safety eyewear distributor offers you a program of protection and correction—correction professionally prescribed to the visual requirements of every job. It gives workers the comfort and added earning power of top visual efficiency—and improves your safety record. Bausch & Lomb Optical Company, 650-12 St. Paul St., Rochester 2, New York.

SAFETY FACT-FINDING CASE HISTORY

MEET ORTHO-RATER VISUAL PERFORMANCE STANDARDS

3 ACCIDENTS AMONG 20 WORKERS

DO NOT MEET ORTHO-RATER VISUAL PERFORMANCE STANDARDS

12 ACCIDENTS AMONG 20 WORKERS

The Ortho-Rater technique of the Bausch & Lomb Industrial Vision Service identifies accident-prone workers. In one department, 80% of accidents happened to people who fell below Ortho-Rater Visual Performance Standards. The B&L Industrial Vision Service is being used successfully to reduce accidents, by placing workers on hazardous jobs according to scientific visual fact-finding. It contributes also to increased production, improved quality, reduced labor turnover and lower training costs.

Write for descriptive bulletin.

BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N. Y.

*Ranking among the top five states as an oil producer, crude oil has long been recognized as one of the most important raw materials produced in Kansas. And Kansas crude is known among refiners as a *good, workable crude*, adapted to processing for all the varied products so essential in today's economy.

It is quite logical, then, that the industrialist should regard Kansas crude in terms of synthetic rubber . . . for millions of barrels of this good, workable crude will ultimately be whirring over the highways as an important factor in America's transportation and distribution system.

Production from Kansas' wells is currently at the rate of some 100,000,000 barrels annually. Underground reserves indicate many years of increased production . . . valuable information for any manufacturer producing from hydrocarbon basic materials.

The brochure
LET'S LOOK INTO KANSAS
summarizes many interesting facts. Ask for it on your letterhead

KANSAS INDUSTRIAL DEVELOPMENT COMMISSION
WILLIAM E. LONG, *Secretary-Director*
804-A Harrison Street Topeka, Kansas

KANSAS *REALLY MEETS INDUSTRY HALFWAY

change in the status of employees whose work they inspect. Moreover, the Board declared, the inspectors possess "a community of interest in the conditions of employment" with production and maintenance employees, receiving comparable rates of pay, similar vacation benefits, and were under the same supervision as the production employees. (Luminous Processes, Inc., NLRB)

The NLRB recently held a multiple-employer unit appropriate for "walking bosses" of Pacific Coast longshoremen and "checkers" who perform clerical work for waterfront employer. On the ground that the two prerequisites for multiple-employer units were existent in these cases, namely, that there was a history of collective bargaining and employee action on a multiple-employer basis, and that adequate machinery to execute such bargaining existed, the Board deemed the unit appropriate. The companies argued that the Board had no authority to find appropriate a unit broader than that composed of the employees of an individual employer, since "there is no obligation on an individual employer to combine himself with other employers, through an association or otherwise, for the purpose of collective bargaining, and there is no obligation on an association of individual employers to act as the bargaining representative of any one or more of its members."

Rejecting these arguments, the Board pointed out that: (1) if the Board were limited to finding a unit composed of the employees of an individual employer, it could not have recognized such units in other instances in which it had previously done; (2) minority groups could seek to have the Board order employers to cease giving effect to beneficial contracts and refuse to renew them; (3) the purpose of the Act would be thwarted by having stable employment relations disrupted; and (4) to preclude the Board from finding such units appropriate would permit the employer to shape the bargaining unit at will, regardless of other compelling factors including their own past conduct, "decisively negating the position they have taken." (Waterfront Employers Association of Pacific Coast, NLRB)

*SEVERANCE PAY AWARDED FOR DISPLACEMENTS

One-man operation of a double-decker bus was permitted by an arbitrator despite contractual provision for requiring the use of two men on the ground that one-man operation of the buses was practical and feasible, the saving in cost would be substantial, and the past losses of the company necessitate a cutting down in expenses. The fact that two-man operation would prove onerous if the company's financial difficulty should be continued is sufficient justification for such an award. Possibility of bankruptcy need not be proved, the arbitrator stated, to effect the change. The employees displaced by such change,

however, were awarded severance pay, the amount of which is to be measured by the individual employee's prospective needs. (In re arbitration between Fifth Avenue Coach Company and Transport Workers Union of America)

*UNION SECURITY CLAUSES UPHELD

The General Counsel of the NLRB unofficially announced that union security clauses under which the employer agrees to encourage union membership without making it a condition of employment are valid under the Wagner Act, provided the following conditions are met: (1) the union involved was not assisted by an action defined in the Act as an unfair labor practice; (2) the union was representative of the majority of the employees in the appropriate unit covered by the contract at the time it was made; (3) the employer's obligation is spelled out in detail.

*DISCHARGE JUSTIFIABLE

Where employees went out on strike in violation of the contract, the employer was held by an arbitrator to be entitled to discharge a union steward, who circulated among employees to advise them of the time of the strike, a shop steward who, after he had punched out, went into another department where several machines were operating and ordered them shut down, and a sub-committeeman who signaled the men to shut down their machines and notified others in advance of the strike. The arbitrator declared, however, that the employer could not single out an ordinary union member for discharge because of his failure to actively end the strike. (In re arbitration between Stockham Pipe Fittings Company and United Steelworkers of America)

INJUNCTION DENIED

A federal district court refused to issue an injunction enjoining an AFL union from picketing the employer's plant to compel the employer to recognize it as the bargaining agency for a number of the employees covered by the contract between the employer and a CIO union. The CIO union had been certified by the NLRB as the bargaining representative of all the employees. The court deemed a strike of such character, i.e., a jurisdictional dispute, a "labor dispute" within the meaning of the Morris-La Guardia Act, and that as such it was prevented by the Act from protecting the employer. (American Chain Company v. Truck Drivers Union, USDC N. J.)

*HELD DISCRIMINATION

The fact that the employer permitted a group of anti-union employees to exclude from the plant a union member who had testified before the NLRB and then refused to reinstate her was deemed by the Board to be an act of discrimination. Five other employees had previ-

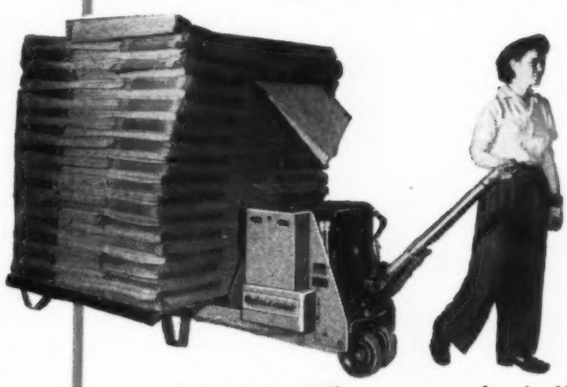
A half century ago,
chain drives were modern
. . . but not in your LIFT TRUCK today

If you judge a lift truck by 1902 standards, a chain drive for propulsion or horizontal travel might suffice. Strangely enough, some lift trucks are still made with old-fashioned chain drives. But 1902 standards just won't do for 1946!

That's why we equip the HYDRO*Lectric* with a fully enclosed *gear drive*. As a result, the powerful, *completely modern* HYDRO*Lectric* is free from the excessive "drag," noisy operation, breakage and other difficulties peculiar to chain drive mechanisms.

The gear-driven HYDRO*Lectric* has far greater efficiency and dependability. Downtime is less, maintenance cost decidedly lower. Superior advantages of the HYDRO*Lectric's* enclosed gear drive are apparent on every operation—and particularly where abrasive materials easily attack and damage an exposed chain drive.

The Motorized
HydroLectric
. . . with Enclosed Positive Gear Drive



The fully automatic HYDRO*Lectric* moves TONS with effortless ease. Responds instantly to patented "Finger-Tip" Control, moving loads forward or backward at the mere pressing of a button! Has 4 wheels for stability, gear drive to load wheel. Costs less than ½ of rider type trucks of equal capacity. Speeds handling tremendously . . . cuts handling cost up to 75% . . . pays for itself 5 and more times a year!

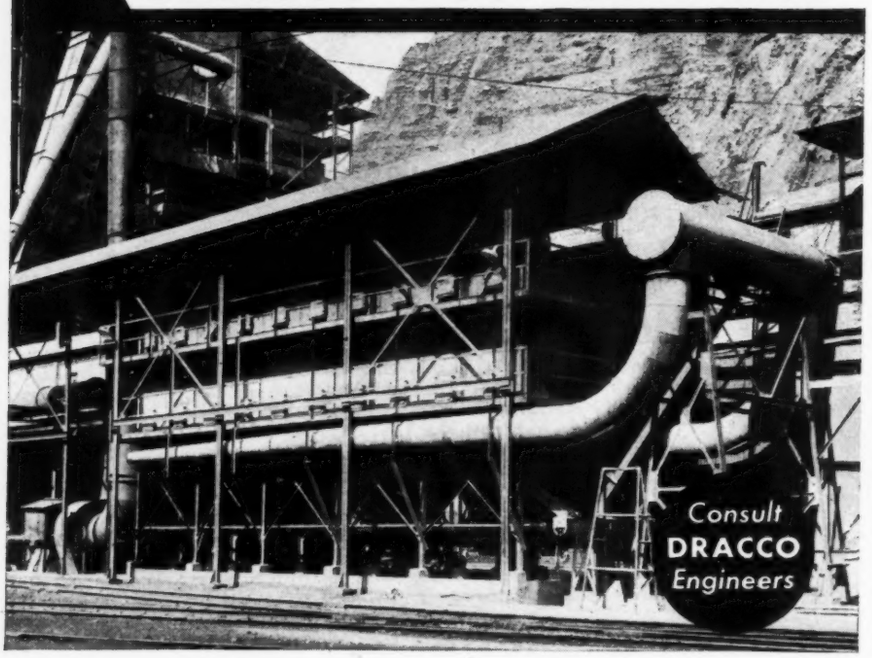
The HYDRO*Lectric* is engineered by the Stuebings, pioneers in lift truck construction since 1910. Write today for Bulletin "A" giving complete details, including prices and list of nationally known users.

LIFT TRUCKS INC. W.W.W. STUEBING CINCINNATI

LIFT TRUCKS, INC.
Walter Stuebing, *President*
2425 Spring Grove Ave. Cincinnati 14, Ohio

Dust Causes Needless Expense

Stop it with DRACCO DUST CONTROL



Dust is the cause of MANY expenses that may add up to a BIG total. It's a daily health hazard ... slows down production ... causes excess wear of bearings and other working parts. Frequently makes it difficult to maintain high quality of a product. Dust ALWAYS causes loss, and DRACCO Dust Control ALWAYS saves money. Why not discuss your dust problems with DRACCO Engineers? Their recommendations, based on over thirty years experience in dust and fume control may lead to considerable savings in your plant.

For Further Information Write

DRACCO CORPORATION

4091 E. 116th St., Cleveland 5, Ohio *New York Office: 130 W. 42nd St.*

DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

ously been excluded from the plant by the same anti-union group, and the employer made no attempt to reinstate them. The Board also ordered the payment of back pay to the employee so excluded, to begin not on the date she requested reinstatement, but rather from the date she had been discriminatorily excluded from the plant. The Board thus made the employer liable for the exclusion because of his failure to take reasonable measures to prevent the recurrence of the former exclusions. (Fred P. Weissman Company, NLRB)

*NO DAMAGES FOR REFUSAL TO WORK

According to a federal district court, the War Labor Disputes Act may not be interpreted to compel an individual employee to work during the 30 day period following the notice of a labor dispute by the union if the individual worker chooses to leave work on his own initiative. The employer, in this case, contended that the provision of the Act which states that "the contractor and his employee shall continue production under all the conditions which prevailed when the dispute arose" imposed upon the individual employees the duty to continue to work. The court construed the purpose of this provision to be the preservation of the *status quo* of working conditions during the 30 day period, and does not serve to deprive the worker of his right to refuse to work. The court declared that the Act sought to avoid strikes called by irresponsible or "hot headed" labor leaders rather than prevent individual workers from refusing to work. Thus, the court concluded that the employer had no action for damages against the individual employees by reason of their refusal to continue production during the 30 day period. (France Packing Company v. Dailey, USDC E. Pa.)

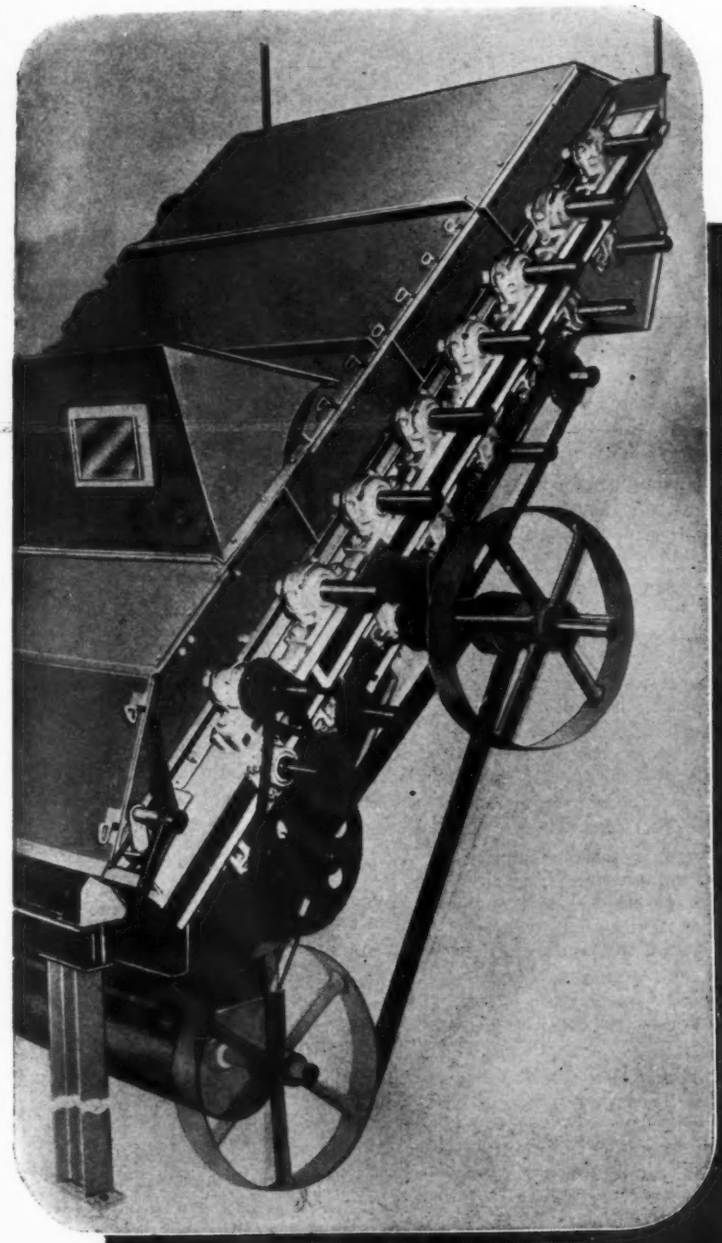
*ISSUE NOT ARBITRABLE

An arbitrator recently refused to rule on a dispute concerning vacations because the parties disagreed as to whether the issue was an arbitrable one. Because of the ambiguity of the contract clause providing for arbitration, the arbitrator would not accept the case without the explicit agreement of the parties to such action. The contract clause providing for arbitration of any matter or dispute not settled by the grievance procedure was interpreted by the union to cover arbitration of disputes concerning new contract terms, but interpreted by the employer to cover only disputes arising under the present terms of the contract. In view of the disagreement of the parties, the lack of history of negotiations or past practice, upon which to base any action, the arbitrator concluded that the matter should be settled by the parties themselves. (In re arbitration between Weil-Kalter Manufacturing Company and International Ladies' Garment Workers' Union)

Protect THE BEARINGS

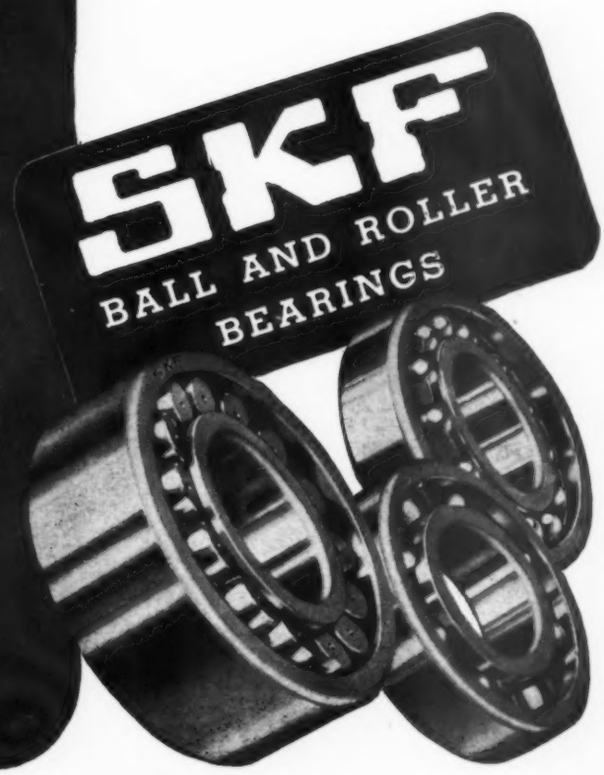
FOR CONTINUOUS COTTON CLEANING !

● Built by CONTINENTAL GIN CO.



Where lubricant leakage, dirt and lint might have numbered the days of bearings in this Impact Cleaner, you find sturdy, compact SKF Pillow Blocks. These pillow blocks pay for themselves within a short time by keeping lubricant *in*, dirt and lint *out*. Their accurate machining assures a precision bearing fit. Made in two pieces, they're easy to assemble, inspect and lubricate. Contact your nearest Authorized SKF Distributor, or write direct. 6152

SKF INDUSTRIES, INC.
Front St. & Erie Ave., Philadelphia 32, Pa.



STOW •
FLEXIBLE SHAFT MACHINE

Cuts Labor Costs!
Cuts Production Time!
Lessens Fatigue!
Power available in any position!

On All These Operations
DRILLING
SANDING
POLISHING

ALSO
Grinding, Buffing, Wire Brushing, Filing!

ONE Portable STOW Mobile Power Unit supplies convenient, plug-in power wherever you need it to accomplish all these operations! Interchangeable heads and attachments fit this one machine for lower-cost operation on many jobs.
Less operator fatigue. The tool comes to the job. Remote connected power unit makes the working end easy to handle. It's a high-performance unit with shop-wide utility. It will pay its way in any plant—big or little.

WRITE TODAY FOR FULL INFORMATION

STOW MANUFACTURING CO.
3 Shear St., Binghamton, N. Y.

they say and do

FOUR STATES ENACT LABOR AMENDMENTS

The November elections brought sweeping changes in the labor laws of four states: Nebraska, Arizona, South Dakota, and Massachusetts. All result from changes in the state constitutions.

Closed shops were outlawed in the first three states named; Massachusetts will henceforth require unions to file public financial statements of all receipts and disbursements in both amount and nature.

The Nebraska amendment is the most inclusive, and carries its own enabling clause. The others, while of similar intent, may permit of varying interpretation when the expected court tests develop.

Because of its sweeping nature and possible effect upon the labor law of other states, the Nebraska amendment is shown here in full:

Be it enacted by the people of the state of Nebraska that the Constitution of Nebraska be amended by the addition of the following article:

Section 1: No person shall be denied employment because of membership in or affiliation with, or resignation or expulsion from, a labor organization, or because of refusal to join or affiliate with a labor organization; nor shall any individual or corporation or association of any kind enter into any contract, written or oral, to exclude persons from employment because of membership in or nonmembership in a labor organization.

Section 2: The term "labor organization" means any organization of any kind, or any agency or employee representation committee or plan, which exists for the purpose, in whole or in part, of dealing with employers concerning grievances, labor disputes, wages, rates of pay, hours of employment, or conditions of work.

Section 3: This article is self-executing and shall supersede all provisions in conflict therewith; legislation may be enacted to facilitate its operation, but no law shall limit or restrict the provisions hereof.

The constitutionality of the Arizona amendment is already being challenged in the federal courts on the grounds that it invalidates existing labor contracts and therefore violates the "due process" clause of the Fourteenth Amendment. Similar action is expected against the Nebraska amendment, and may hinge on the type of enabling legislation subsequently passed. If the enabling act specifically exempts existing contracts, it appears probable that other grounds will have to be found to challenge the amendment.

FAILURE TO REACH GOALS CAUSE OF WORKER UNREST

E. WIGHT BAKKE, Director, Labor and Management Center, Yale University, speaking before the Society for the Advancement of Management

Men join unions, go on strike, soldier on the job, stay away from work because they are trying to reduce tensions and anxieties they experience when something is wrong with their structure of living. . . . They are frustrated in their attempts to reach one or more of their goals.

Men want the assurance of and progress toward:

1. *Respect of fellows.* The desire to play a socially respected role and to be treated justly.

2. *Creature sufficiency.* The desire to have that degree of creature sufficiency (food, clothes, shelter, etc.) enjoyed by the most favored of one's customary associates.

3. *Increasing control over one's own affairs.* The desire to have one's decisions effective . . .

4. *Understanding.* The desire to . . . "know the score."

5. *Capacity performance.* The desire to utilize in living the full range of capacities possessed, both actual and potential.

6. *Integrity or wholeness.* The desire to experience consistency within one's self, among the parts of one's world, and a significant relationship to that world.

Managers of men will do well to keep themselves abreast of developments along this line, changes in the way their workers define their objectives, what they want to get out of life and work. You cannot control all the forces that stimulate those changes, but you are working in the dark unless you know what they are.

Management can do very little about the adequacy or inadequacy of the natural environment and the

Portrait of a MAINTENANCE MAN

A little exaggerated, perhaps . . . but what we're trying to say is simply this: FEDERAL NOARK Products are built to provide dependable performance wherever they're installed. Their many exclusive features of design and construction mean a minimum of supervision... and a real saving in maintenamce costs. It's good sense—and good business to specify FEDERAL NOARK Electric Products! . . . Federal Electric Products Company. Executive Offices: 50 Paris Street, Newark 5, N. J. Plants: Hartford, Conn., Newark, N. J., St. Louis, Mo., L. I. City, N. Y.

Portrait of FEDERAL NOARK Magnetic Starter, Bulletin 404 in action

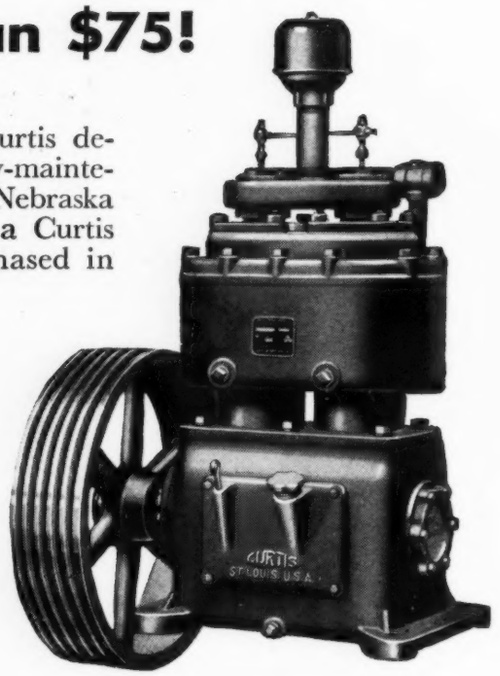
Federal NOARK

INDUSTRIAL CONTROLS

Federal Electric Products Company, manufacturers of a complete line of electrical products including: Motor Controls, Safety Switches, Circuit Breakers, Service Equipment, Panelboards and Switchboards

CURTIS
AIR COMPRESSOR
Operates 14,000 Hours with Maintenance of Less than $75!

Here's proof of Curtis dependability and low-maintenance expense. A Nebraska user writes about a Curtis Compressor purchased in 1926 that "14,000 hours of operation resulted in an expenditure for repairs, including labor, of less than $75!"



Check these outstanding features

- Timken-bearing equipped
- Carbon-free disc-valves
- Self-oiling — positive-pressure lubrication
- Parts readily accessible and interchangeable
- Electric motor or gasoline-engine driven
- Automatic pressure-unloader
- Precision construction throughout

92 Years of Successful Manufacturing

Also, learn how Curtis Air Hoists offer a faster and smoother performance of hoisting, lowering, pushing or pulling.

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1995 Kienlen Avenue St. Louis 20, Missouri

F-515

Please send me Bulletin C-7 on Curtis Air Compressors and Curtis Air Hoists.

Name.....

Firm.....

Street.....

City.....Zone.....State.....

resources that it offers to human beings . . .

Management can do much if the inadequacy is in the social resources made available in the factory . . .

The possibility of unemployment or unsteady employment is a threat not only to the worker's personal resources in income and material possessions, but also to his skills, his place in the status system, indeed to almost every element in his structure of living, and hence is an obstacle to reaching every one of his goals. To union members, certain actions of employers may appear as a threat to the organizational set-up of the group solidarity of their union. Many a strike has been prolonged beyond the point of economic advantage to workers because of the determination to resist what is felt to be a threat to the stability of the union organization . . .

At this point you very properly ask, "What have you to suggest?" I don't have the complete answers . . . but the need for answers is too great and the value of getting the right answers too important to permit giving up . . .

If knowledge and wisdom are to be cumulative, it is desirable to have a pattern for thinking into which the nature and significance of each new observation can fit . . . Men can learn from each other and act accordingly if they share a common pattern of analysis and use the same terms. Until they achieve that common language, progress toward industrial peace and efficient human relations will be accidental.

BETTER PUBLIC RELATIONS NEEDED, NEMA IS TOLD

WHIPPLE JACOBS, President, Belden Manufacturing Company, speaking before the National Electrical Manufacturers' Association

The human relations side of business merits equal rank with products, production, and finance . . . telling is as much a responsibility of management as doing.

It is not enough to persuade the public on the quality and desirability of your product—you must go beyond that function and help persuade the public of the desirability of the American way . . . Our system of free enterprise must be understood if it is to continue.

It cannot be emphasized too often that right principles and practices form the very heart of true public relations. Mere lip service will not do. We must never lose sight of the

Buy the Best

DRY-TYPE TRANSFORMER!

FEATURES	Allis-Chalmers	Make "B"	Make "C"	Make "D"	Make "E"	Make "F"	Make "G"
Class "B" Insulation	YES	NO	YES	NO	NO	NO	NO
Light Weight, Compact	YES	NO	YES	NO	NO	NO	NO
Clamp Connectors	YES	NO	NO	NO	NO	NO	NO
Voltage Regulating Taps	YES	NO	YES	NO	NO	NO	NO
Conduit Knockouts	YES	YES	YES	YES	YES	YES	YES
Modern, Attractive Appearance	YES	NO	YES	YES	NO	NO	NO
Quiet Operation	YES	NO	YES	NO	NO	NO	NO

Compare leading makes. Only A-C's new Class "B" Insulated units give you all 7 important features!

Class "B" insulation in Allis-Chalmers new Dry-Type Transformers reduces overall size as much as ⅓ over conventional Class "A" insulated types — reduces weight 22 to 38% — means wider range of installation... enables you to locate power almost any place you want it!

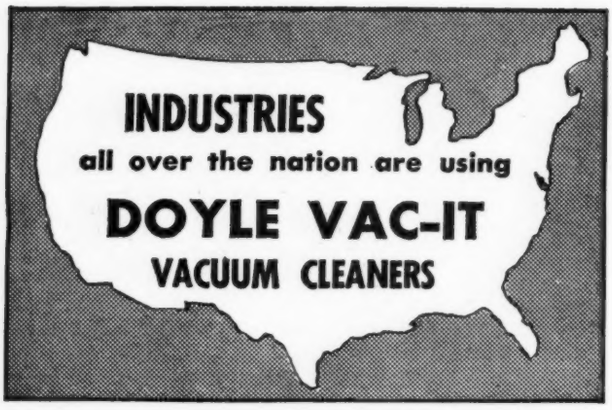
These Class "B" insulated units require less mounting materials — eliminate insulating liquids and fireproof vaults — give longer service for no increase in cost over Class "A" insulated types... adding up to lower overall cost for you!

For complete details get in touch with your nearby Allis-Chalmers dealer or sales office, or send for new bulletin B6382. ALLIS-CHALMERS, MILWAUKEE. A 2081

CLAMP connectors are a standard feature of the new Allis-Chalmers transformer. Gives anchor point for connecting either 480 or 240 voltages on both high, low voltage sides — means easier, faster installation for you!

SMALLER AND SAFER, these new improved units are priced as low as comparable Class "A" insulated types. You can choose from 14 sizes ranging from 1½ to 200 kva, single-phase and 10 to 300 kva three-phase.

ALLIS AC CHALMERS DRY-TYPE TRANSFORMERS



From Canada to the Gulf of Mexico — from Maine to California — manufacturing plants and factories in every field of industry are securing maximum cleaning service and reducing maintenance costs with Doyle VAC-IT Vacuum Cleaners.

The VAC-IT operates efficiently and economically in cleaning tasks. Doyle has experience and equipment to solve most any cleaning problem. Why not write today for information regarding your cleaning problem?

Doyle VAC-IT

DOYLE VACUUM CLEANER CO., 1335 Stevens St., S.W., Grand Rapids 7, Mich

need for fair and progressive policies designed to meet changing times and conditions.

We break down our publics into five major categories, and we give first place to our employees. (Others —consumer-customers, stockholders, civic bodies, and the press.) In every way possible we . . .

Strive to demonstrate that we are as much interested in the individual employee as we are in making profits . . .

Spend part of the sales appropriation in institutional selling of the free enterprise system to the customer-consumer group . . .

Make it a point to make friends of shareholders by giving them full information, and invite their criticism and comment . . .

Take part in and support, community drives of all kinds . . . serve on various civic bodies, from school boards to chambers of commerce and other groups dealing with community betterment . . .

Stand ready at all times to cooperate with newspapers, magazines, and other media that may want news.

This field of human relations is too broad to limit its practice to the few men in that particular department of a business or to a counselor retained to give guidance. It is something that should be understood and practiced by all supervisory personnel, those who contact all segments of our various publics and, for that matter, by all employees.

FAVORED UNIONS CREATE ECONOMIC DILEMMA

FRANK RISING, General Manager, Automotive & Aviation Parts Manufacturers, Inc., in "Memo to Management"

Already we can see the beginnings of the approach, similar to that used last year, wherein government reports are used in twisted form by unions and parlor liberals to persuade the working man that the boss is a greedy, profit-piling person, and that wages can be advanced by 10 to 25 percent without altering prices. There is talk, for example, about the report from Commerce, which shows first-half profits in 1946 "more than double" those of first-half 1945. You are not likely to hear from these spokesmen that the businesses used to head the profit-increase report are retail trade, motion pictures, radio broadcasting, alcoholic beverages, wearing apparel—and that the same report shows a decrease in reported profits for iron and steel, industrial

'The Weather Man' never lets up on roofs

Give your roof LIQUID ALUMINUM protection

Day after day, "Old Man Weather" attacks roofs. Rain, snow, hail, and sun cause blisters, peeling, dried felts, and alligatoring.

Coatings of *Liquid Aluminum* help even the best bituminous roof ward off these constant attacks. Roofs of factories, stores, schools, or public buildings when protected with coatings containing Reynolds Special Roof Coat Pigments last longer, need less attention.

With these coatings a thin metallic shield is formed by thousands of tiny inter-locking flakes of pure aluminum that acts as a protective parasol . . . reflects up to 75% of sun rays . . . keeps out moisture . . . resists decay . . . reduces temperatures *under* the roof.

For best results insist on aluminum roof coatings of standard quality made from Reynolds Special Roof Coat Pigments, formulated only with a proper type of vehicle. These superior pigments are brighter . . . give greater reflectivity because they're made from purest Reynolds Aluminum foil stock . . . rolled . . . flaked . . . polished to maximum brilliance . . . quality-controlled throughout production.

See your supplier of roofing products for complete details, or write Reynolds Metals Company, Pigment Division, 19 East 47th Street, New York 17, New York.

REYNOLDS ALUMINUM PIGMENTS

ROOF COATINGS OF LIQUID ALUMINUM

1294-P6-7B

You pay for the best . . .

Why not get it?

GUARANTEED COST EQUALIZATION PLAN

A NEW WAY TO BUY FLOOR TREATMENTS

This **FREE** *booklet*

tells how you can have the finest in floor treatments at your present cost, or *less!*

Now, by actual test on your own floors you can prove to yourself under a *written* money back guarantee, that Continental "18" stays clean longer . . . outwears your present floor treatment . . . yet costs no more! (Manpower savings due to fewer applications not counted.) *You* are sole judge of any excess cost to be refunded.

Continental Car-Na-Var, world's leading manufacturer of heavy duty floor treatments, can make this offer because Continental "18" *has proved cheapest in the long run* in heavy traffic centers everywhere. For full information, write for FREE booklet.

Use . . .

CONTINENTAL "18"

THE SUPER FLOOR FINISH

It costs no more!

Continental Car-Na-Var Corporation

1632 National Ave., Brazil, Indiana

SPECIALISTS IN HEAVY DUTY FLOOR TREATMENTS

machinery, motor vehicle parts and accessories, electrical machinery, and other metal-working trades.

The metal-working employee probably will be encouraged to go out on strike under the exciting prospect that his boss can afford to pay big increases again. His boss in many cases is going to feel that the illogical chain of last year should not be forged again. His boss is quite properly going to protest that any substantial increase in wages at this time, with hit-and-miss production and low efficiency, can mean only that wages are costs, costs become prices, and that he is on the edge of being priced out of his market.

INCREASES NOT UNIFORM

What has happened to our economy is that we have pulled part of it away from the rest, insofar as wage and price structure is concerned. The latest figures show that in all manufacturing about half of the employees received increases of from 5 to 18 cents an hour since V-J Day, some 23.4 percent received increases of from 18 to 25 cents, and 24 percent received none at all or less than 5 cents. In non-manufacturing, nearly half have received no increase since V-J Day, and another 30 percent received less than 10 cents per hour.

There simply aren't enough people employed in making steel, automobiles, electrical goods, and the other items that were pressured into the 18-cent-and-up increases, to purchase "mass volume" of the goods they themselves make. And the greater part of the unfavored "mass-purchasing" market can't afford to pay the prices.

This is the situation as the favored unions prepare to come in and ask another round of substantial increases for the aristocracy of labor that they represent. It poses a terrible dilemma for the economy.

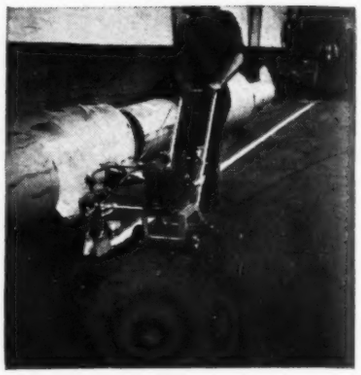
ACADEMIC LEAVES FOR INDUSTRY EMPLOYEES

What is said to be American industry's first experiment with paid academic leaves has commenced at Monsanto Chemical Company.

Borrowing an idea — sabbatical leave — from universities and colleges, the company is rewarding four of its productive scientists with a year's leave of absence, at full pay, for academic study.

One of the winners is a research

INDUSTRIAL AISLE-MARKER



SPRAY PAINTS 2" TO 6"

Clean cut line

Fast, accurate, flexible, low in cost

MODEL CTL-9: Has compressor and electric motor

MODEL CTL-8: without compressor. Connects to plant air lines

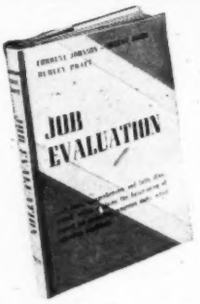
(Send for literature)

INDUSTRIAL TOOLS & PRODUCTS CORP.

614-622 Jefferson Ave.
Rochester 11, N. Y.

An important tool for establishing good labor relations

JOB EVALUATION



By FORREST H. JOHNSON, *Assistant Chief Industrial Engineer,* ROBERT W. BOISE, JR., *Chief Industrial Engineer,* and DUDLEY PRATT, *Editor-in-Chief, Boeing Handbooks—all at the Boeing Aircraft Company*

This book discusses the subject in all its practical aspects. Job evaluation provides, in its planning stages and in its operation, a channel for day-by-day discussions and agreement between management and labor. By describing a typical job evaluation plan, and its successful operation, JOB EVALUATION shows how the labor-management strife which may confront every industrialist and businessman, supervisor and labor leader may be alleviated, if not erased. The book clarifies the analytical nature of job evaluation, the relationship between the evaluating system, employees, and the company's organization, and the procedural steps necessary to install and maintain the system.

1946 288 pages $3.75

ON APPROVAL COUPON

JOHN WILEY & SONS, INC.
440 Fourth Ave., New York 16, N. Y.

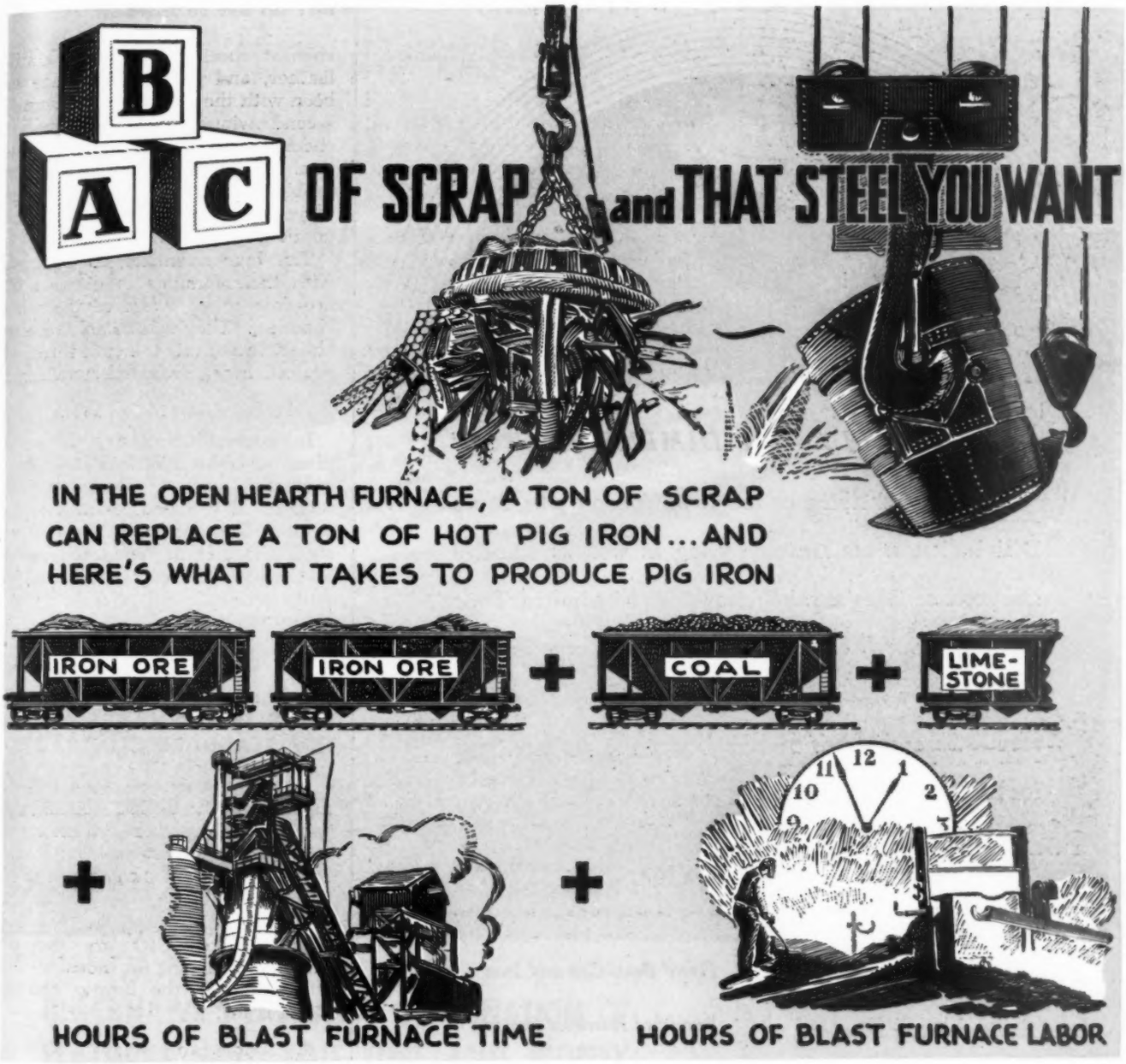
Please send me a copy of JOB EVALUATION on ten days' approval. If I desire to keep the book I will remit $3.75 plus postage; otherwise I will return the book postpaid. FM-11-46

Name _____

Address _____

City _____ State _____

Employed by _____
(Not valid outside United States.)


B
A C
OF SCRAP and THAT STEEL YOU WANT
IN THE OPEN HEARTH FURNACE, A TON OF SCRAP CAN REPLACE A TON OF HOT PIG IRON... AND HERE'S WHAT IT TAKES TO PRODUCE PIG IRON
IRON ORE
IRON ORE
COAL
LIME-STONE
HOURS OF BLAST FURNACE TIME
HOURS OF BLAST FURNACE LABOR

TO you "scrap" may be just worn-out machinery, broken pipe and such junk---worth nothing to your business.

But it IS worth a lot to your business delivered to the steel producer. Scrap may be the means of supplying you with more of the new steel and steel products you want.

As every buyer knows, steel is produced by "blending" hot pig iron and scrap in the open hearth furnace. Each ton of available scrap can replace a ton of pig iron. The greater the shortage of scrap, the heavier the drain on pig iron supply to produce a given tonnage of steel.

But every extra ton of pig iron produced calls for the use of approximately two extra tons of iron ore, one extra ton of coal and one extra half-ton of limestone, processed in a blast furnace, involving many extra hours of time and labor. It is obvious that there is a limit to America's blast furnace capacity. So the quickest, most effective way to produce maximum steel tonnage now is to find and use more scrap.

Help yourself to more steel by starting more scrap into the channels that serve the mills.

QUALITY YOUNGSTOWN SERVICE

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

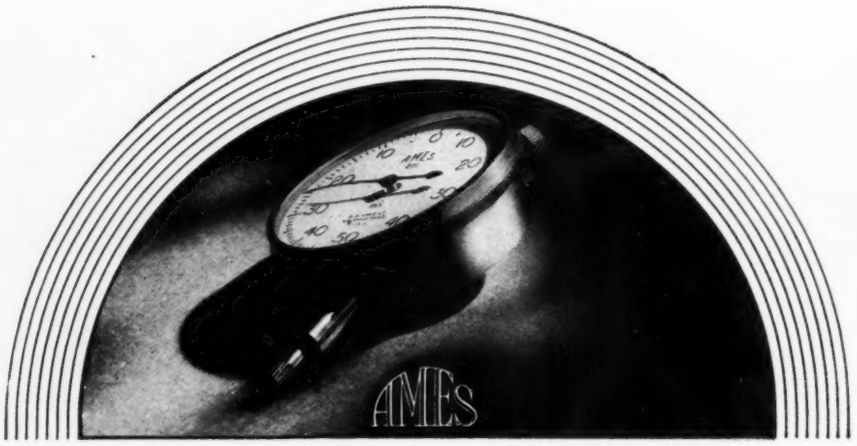
GENERAL OFFICES - YOUNGSTOWN 1, OHIO

Export Offices - 500 Fifth Avenue, New York City

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Electrolytic Tin Plate - Coke Tin Plate - Rods - Wire - Cold Drawn Carbon Steel Rounds - Tie Plates and Spikes.



GOOD IN THE 4TH DIMENSION, TOO!

For tool checking or tough production jobs, Ames Dial Indicators are *time*-conserving as well as sensitive and accurate. They're *quickly* mounted and adjusted. Their dials are *instantly* readable. But *most time-saving* is their ability to stay *right* on the job, without internal adjustment—*longer* than any other indicator you can buy. Send for illustrated Catalogue.

Representatives in principal cities **B. C. AMES CO.** *31 Ames Street Waltham 54, Mass.*

MANUFACTURER OF MICROMETER DIAL GAUGES AND MICROMETER DIAL INDICATORS

4 Sizes—60 Models

English or Metric Measure

Balance or Continuous Dials

Plain or Compound Movement

Many Graduations and Ranges

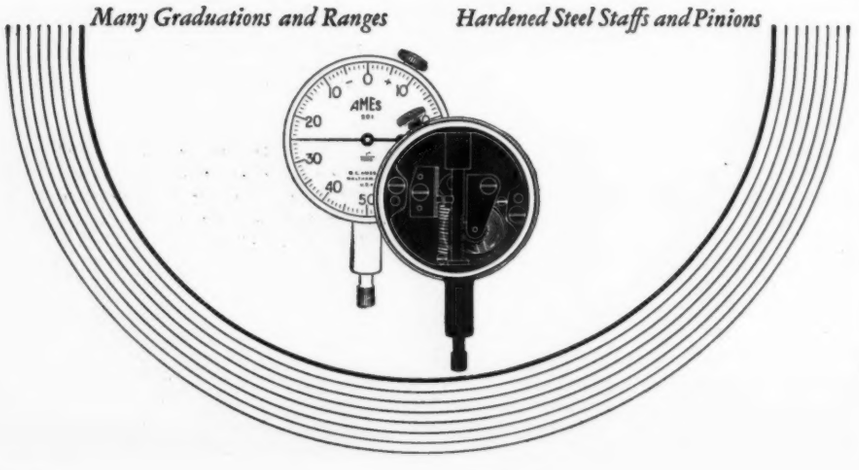
Forged Brass Case and Stem

Burnished Hardened Bearings

Forged Wheel Supports

Hardened Steel Guidepin and Guide Block

Hardened Steel Staffs and Pinions



chemist specializing in the textile, leather, and paper fields. He has been with the company 24 years. A second winner has specialized in chemical engineering and production. Another has been tackling problems in plastics. The fourth employee is a group leader of an aliphatic chemical program.

The four scientists, in returning with their families to campus life, are free to do work of their own choosing. They will be able to apply their industrial experience to projects in pure research, and in such study renew, without limitation, their contacts with the world of theory.

In succeeding years Monsanto plans to make additional awards of industrial leave to deserving technicians. It is hoped that in addition to other benefits the plan will help strengthen bonds between industry and universities, and that a resulting unity of effort will produce notable laboratory success.

HANDLING DEMANDS FOR STANDARD CONTRACTS

Minimum contract standards demanded by two CIO unions give warning of a trend toward labor control by the international rather than by the individual bargaining unit.

American Newspaper Guild-CIO and United Electrical, Radio, & Machine Workers-CIO are the two unions now asking for industry-wide standards. In the former, the demand is for:

1. A minimum wage of $100 per week for fully experienced reporters, photographers, and advertising, circulation, and other employees in top key classifications.

2. A floor of $50 for adult full-time workers in any classification.

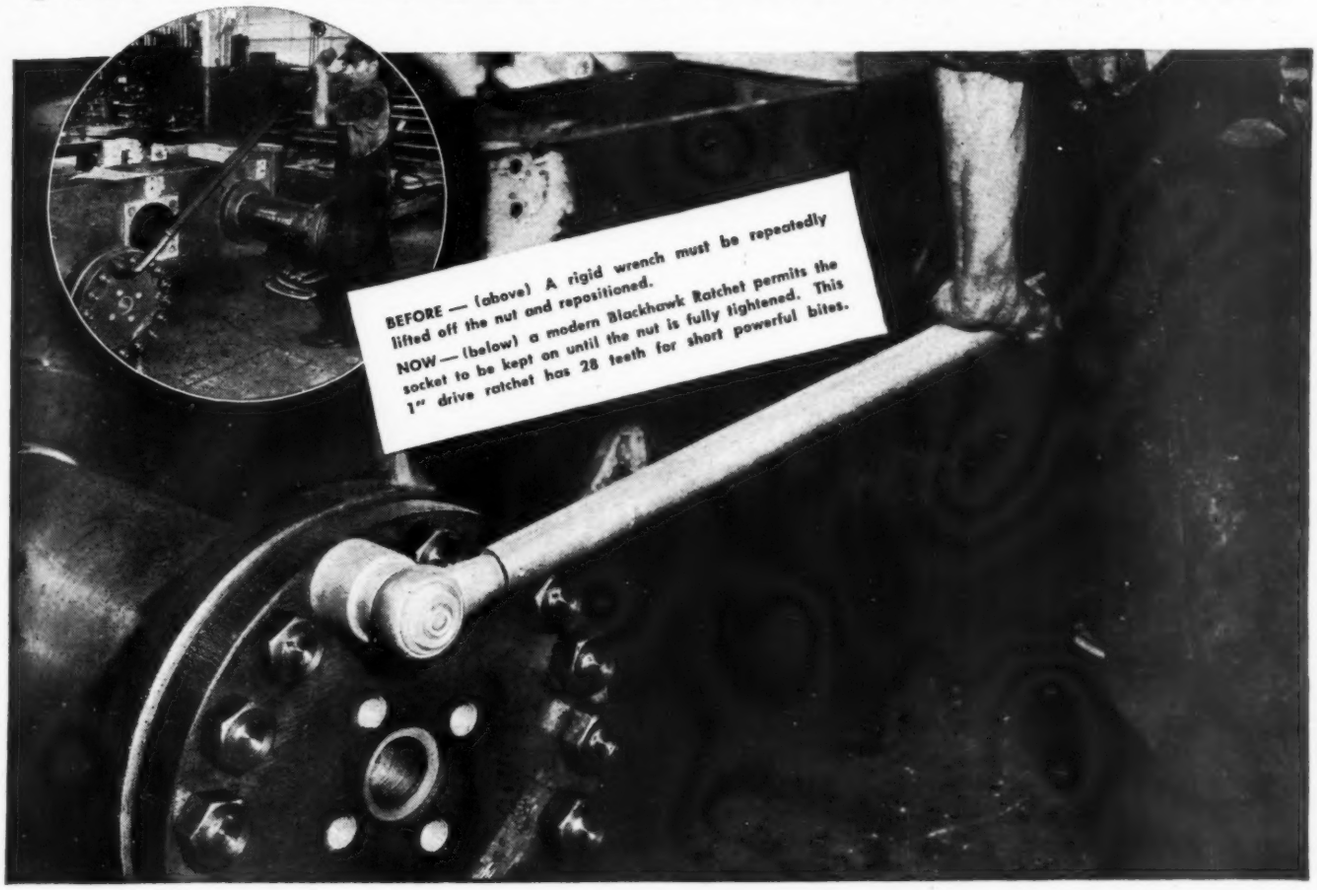
3. A premium wage minimum for wire service employees because of higher productivity resulting from syndication.

4. Four-week vacations.

5. Guaranteed job security.

Appraising the issue, the Commerce and Industry Association states that the problem of minimum contract standards is: "Shall we deal with these unions on the basis which they propose and thereby permit control of bargaining to pass out of the hands of our employees and into the hands of an International union

Here's How Blackhawk Socket Wrenches
SAVE 2 HOURS A DAY on this Job



BEFORE — (above) A rigid wrench must be repeatedly lifted off the nut and repositioned.
NOW — (below) a modern Blackhawk Ratchet permits the socket to be kept on until the nut is fully tightened. This 1" drive ratchet has 28 teeth for short powerful bites.

BLACKHAWK'S EXCLUSIVE COMBINATION OF FEATURES SAVE YOU TIME AND MONEY

ONLY Blackhawk Wrenches combine all these features — sturdy, thin walls that let sockets squeeze into tight spots — clean, hot broached sockets for long life and less nut wear—patented thumb release Lock-On for *extra* safety—all the drives to serve the complete range of socket sizes—and a complete assortment of handles and accessories that build up into scores of combinations for *extra* utility. Ask your Blackhawk Industrial Supply Salesman for a Blackhawk wrench catalog — or write us.

A Product of **BLACKHAWK MFG. CO., Dept. W27126 Milwaukee 1, Wis.**

PATENTED "LOCK-ON" Saves Time, Temper & Machinery

A Blackhawk Socket and handle go together with a "click" that says they're really locked to stay — no danger of socket sticking in tight places or dropping off accidentally. Then, to disengage, the user just presses the "thumb release" button and pulls the combination apart.

Always Specify

BLACKHAWK SOCKET WRENCHES

CUSTOM MADE
To Your REQUIREMENTS
If you require coated fabrics for specific applications, Hodgman will engineer them for you.
Such valuable properties as great flexibility, light weight, unusual toughness, resistance to stains, abrasion, extremes of temperature, and protection against moisture, deterioration and many chemical agents can be built to order in Horco Fabrics.
Hodgman's laboratory facilities and expert engineering service are available to you. Your inquiries are solicited.
HODGMAN RUBBER CO.
Framingham, Mass.
HORCO Fabrics

BY WATER COOLER SPECIALISTS
Thirst Satisfaction
BUILT TO LAST
OASIS
ELECTRIC WATER COOLERS
IN OASIS Electric Water Coolers, superb drinking performance is backed by superior construction — from the rugged stainless steel top to the sturdy, recessed base. The heavy-gauge steel of the handsome, louvred cabinets is both galvanized and bonderized, then given one baked-enamel coat plus two full coats of wear-resistant lacquer-enamel. Bases, too, are specially triple-coated to defy continual "toe-kicks" and exposure to water and cleaning agents used in floor maintenance. Elimination of rust by EBCO's 20 years of specialized "know-how" in water cooler manufacture adds to your "lasting" satisfaction.
THE EBCO MANUFACTURING COMPANY
401 W. TOWN ST., COLUMBUS 8, OHIO

establishing industry-wide standards?"

In answer to the question the association proposes this strategy:

1. If a company determines to go along with the policy of union control of its employees, it should simply accept minimum contract standards laid down by the union; but for its protection it should insist upon a "most favored employer" clause in its contracts, enabling it to cut its condition down to the level at which the union has settled with other companies.

2. If, on the other hand, a company decides to attempt to preserve its direct relationship with its employees, then a different question arises. The company may either resist on the specific terms of the minimum standard contract—e.g., maintenance of membership, Saturday premium pay, etc., or it can take the alternative course of challenging the right of the union to bargain at all under the restrictions of the international. The latter course would seem to be preferable and the specific strategic steps to accomplish it would be to inquire of the union representatives when the contract containing the International policy is presented, whether or not the employees in the bargaining unit have the power to overrule or depart from the International policy and accept a contract suitable to them. If this question is answered in the affirmative (preferably in writing), then bargaining can proceed on the specific items of the contract with assurance that the interference of the International will not block a settlement satisfactory to the Local.

3. If, on the other hand, such assurance is not given, the employer should immediately refuse to bargain about any of the specific terms of the contract, and should rest its refusal on the ground that the Wagner Act requires the employer to bargain with the representatives of his employees, that when the power to determine the terms of the bargain is taken out of the hands of his employees and vested in an international, the union ceases to represent the employees, hence the employer has no obligation to deal with the union. In taking this step it must, of course, be realized that either a strike or an unfair labor practice charge may immediately follow. It is, generally, better to have the strike occur at this stage of the

SEND FOR THIS BOOK... it's FREE to You

YOU'LL want this book! It's the only one of its kind. Prepared by Minneapolis-Honeywell with the assistance of F. W. Hutchinson, nationally recognized authority on panel heating and Honeywell consultant, this manual clearly, concisely, and completely covers the theory and application of automatic radiant panel heating controls. The material in the book is based upon the results of several years of research and tests in homes, commercial buildings and institutions.

Here's a book you will want to study for complete, up-to-the-minute information — then keep for permanent reference. It's a contribution to the heating industry by Honeywell, and is offered free to you. Mail the coupon today.

MINNEAPOLIS
Honeywell
CONTROL SYSTEMS

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
2606 Fourth Avenue South, Minneapolis 8, Minn.

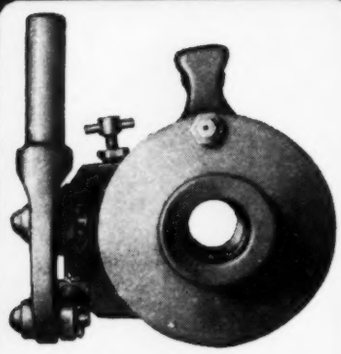
Please send my free copy of "Automatic Control of Radiant Panel Heating"

Name_____

Address_____

City_____ State_____

It's All in the HOLE! —of the Simplex Jenny



Simplex Jenny: capacities 30, 60, 80 and 100-tons. Center hole 1⅛" to 3¼" diameter.

Looking down through the *Center Hole* of the Simplex Jenny Center Hole Hydraulic Puller, you can readily see why this compact unit enables one man to pull, push or lift as much as many men working with old methods. Shaft slipped through center hole is readily clamped, bolted or lugs welded on to provide back up for ram — reducing the time required for numerous tough, heavy jobs from hours to minutes. Ask for Bulletin 44-J.

Templeton, Kenly & Co.
Chicago 44, Ill.

SIMPLEX
WORLD'S MOST COMPLETE LINE OF
JACKS
LEVER
SCREW
HYDRAULIC

game than to try to bargain the employees into a contract later because it is contrary to International policy. In other words, if the employer is not prepared to yield on all the points of International policy, it is better to face the fact at the beginning of the negotiations rather than at the end.

UNION LEADERS SIGNED FOR COMMUNISM

New use of a tool for exposing Communists helped Allis-Chalmers fight minority elements blocking strike settlement in Milwaukee. The tool was photostatic proof sent to all A-C employees showing that union leaders had signed their names under this statement — "Principle represented: COMMUNIST."

Original of the statement and the signatures appeared on nominating papers for Sigmund G. Eisenscher, Communist candidate in the Wisconsin gubernatorial race.

The booklet removed the concealment so zealously guarded by Communists and their sympathizers. Signers, circulators, notaries of Eisenscher's papers were the ranking officers of the Allis-Chalmers CIO union, Local 248, attorneys who have customarily represented the union, members of the union's educational staff, and about 40 percent of the union's stewards.

PREDICTS HUGE SPENDING TO DISPERSE INDUSTRY

(Based on an exclusive interview)

Dispersal and decentralization of American industry, coupled with huge government spending, is seen as a necessary consequence of possible atomic attack. Richard R. Dupree, Chairman of the Army and Navy Munitions Board predicts further that the government will step in and channel this dispersal into a preconceived military pattern.

"Just how much this would cost is not known—but it is an astronomical figure."

Dupree also expressed himself in favor of tripling the current outlay of $100,000,000 a year for stockpiling critical materials. He did say, however, that during the present period of critical shortages the Board is staying out of crowded markets as much as possible.

Now taking shape, according to Chairman Dupree, is an over-all

HIGH SPEED — HIGH CAPACITY

A TURBINE-DRIVEN IMO

The IMO PUMP provides a maximum of capacity in a minimum of space due to the fact that it can be operated at high speeds connected directly to motor, turbine or other machinery.

Where space is a problem install IMO —the reliable rotary, positive displacement pump having only three moving parts and no gears, pistons, sliding vanes or valves.

For further information send for catalog I-129-J

IMO PUMP DIVISION
of the
DE LAVAL STEAM TURBINE CO.
TRENTON 2, NEW JERSEY

A CENTERED EYE IN 1 OPERATION

Precision **CENTERED EYE** *Bending*

With DI-ACRO BENDERS

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at high hourly production rates. Both eyes and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

DI-ACRO BENDER NO. 1

DI-ACRO Precision Bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

DI-ACRO is pronounced "DIE-ACK-RO"

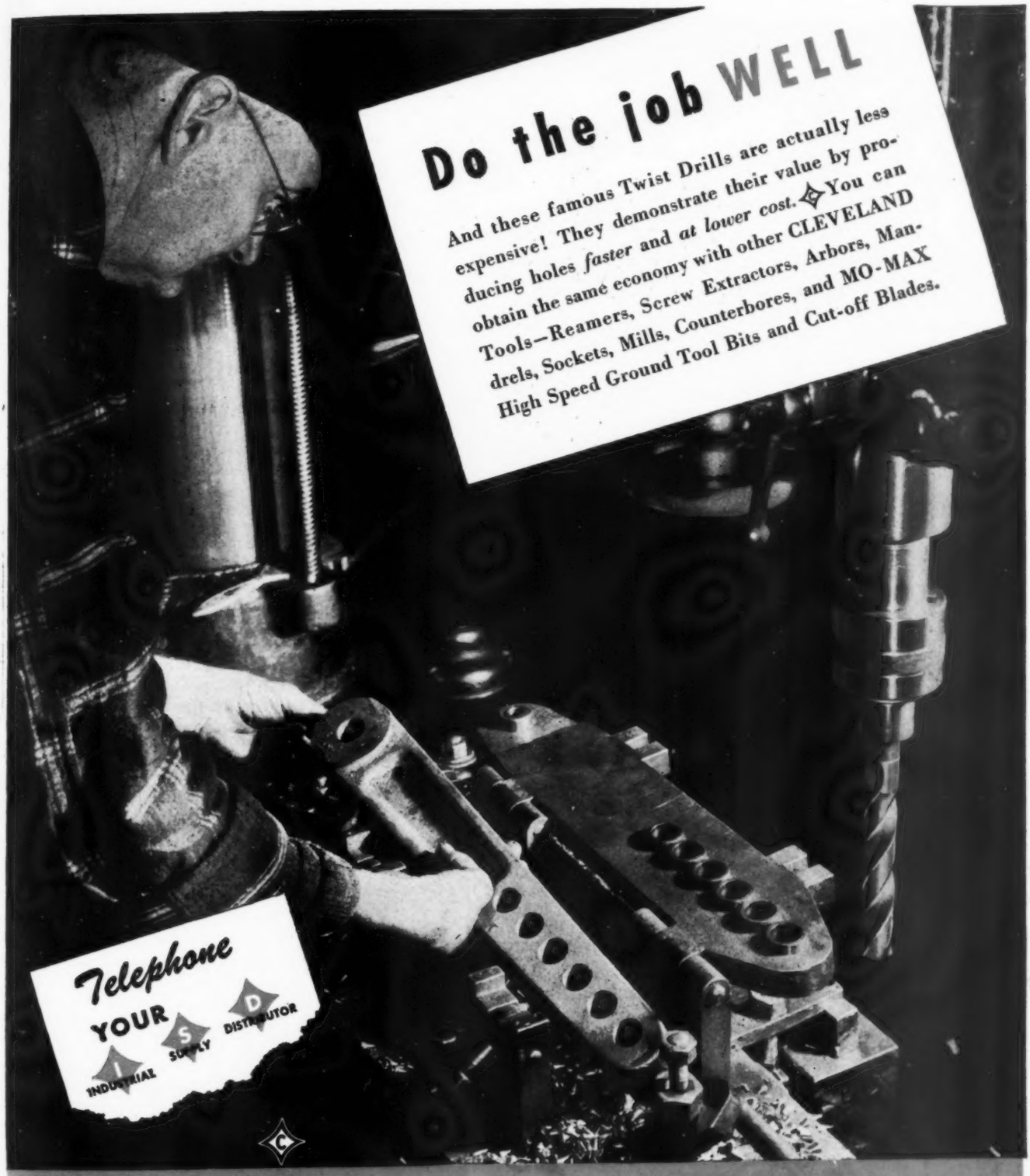
Send for Catalog

"DIE-LESS" DUPLICATING showing many kinds of "die-less" duplicating produced with DI-ACRO Benders, Brakes and Shears.

O'NEIL-IRWIN MFG. CO.
357 EIGHTH AVE., LAKE CITY, MINN.

CLE-FORGE HIGH SPEED DRILLS

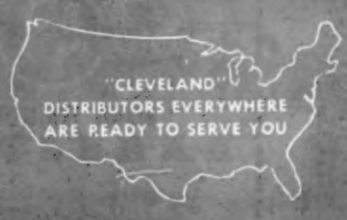
TRADE MARK REG. U.S. PAT. OFF.

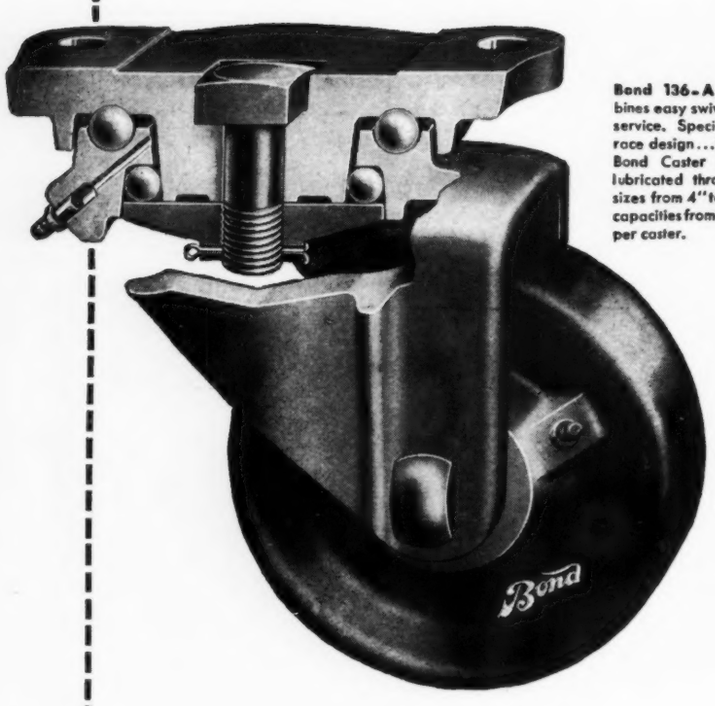

Do the job WELL
And these famous Twist Drills are actually less expensive! They demonstrate their value by producing holes *faster* and *at lower cost.* You can obtain the same economy with other CLEVELAND Tools—Reamers, Screw Extractors, Arbors, Mandrels, Sockets, Mills, Counterbores, and MO-MAX High Speed Ground Tool Bits and Cut-off Blades.
Telephone YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND 14

TRADE-MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

70 THOMAS ST., NEW YORK 7 • 9 NORTH JEFFERSON ST., CHICAGO 6 • 659 HOWARD ST., SAN FRANCISCO 5,
2959 EAST GRAND BLVD., DETROIT 2 • 1962 NORTH FIELD ST., DALLAS 4
E. P. BARRUS, LTD., LONDON W. 3, ENGLAND





Bond 136-A Caster. Combines easy swiveling with long service. Special double ball race design... built of durable Bond Caster metal. Pressure lubricated throughout. Wheel sizes from 4" to 12" dia., load capacities from 600 to 1700 lbs. per caster.

Which is the right caster for your needs? Let Bond —specialist in built-for-the-job truck casters—recommend the caster that meets your actual service conditions. Bond recommendations are always impartial because there's a Bond caster for every industrial requirement. Speed your materials handling with these easy swiveling . . . sturdy casters. Do the job right . . . get the caster that's precisely right. Send for the free Bond catalog—it's a step in the right direction.

BOND FOUNDRY & MACHINE CO., MANHEIM, PA.

plan for industrial mobilization, the cornerstone of which is a coordinating agency along the lines of the wartime WLB. In a recent speech, he "guessed" that ANMB's basic plan would be blocked out and ready for final revision by the end of 1947.

WHAT LABOR LAW REVISIONS ARE NEEDED

ROBERT LITTLER, Former Director, Pacific Coast War Labor Board, speaking before the New England Council

I think that in the public interest we are going to have to review the so-called right to strike . . . I suggest that a great deal of the dogma concerning the right to strike is misplaced emphasis . . . there is a considerable difference between making a man work and . . . the right to take concerted economic action for the purpose of accomplishing social objectives.

There are at least two approaches that could be made:

1. . . . Adopt an anti-trust law with respect to trade unions.

I do not think the analogy is complete between a union and a business. I think that it probably is true that a union is not effectual unless it has a monopoly, and that therefore the analogy between the legislation which will probably be proposed for unions and the Sherman Anti-Trust Law, is not well founded. The analogy should be founded more on treating a union like a public utility.

2. . . . Encourage employers to build up a counterweight of organizations on their part.

Of the two, I prefer the second.

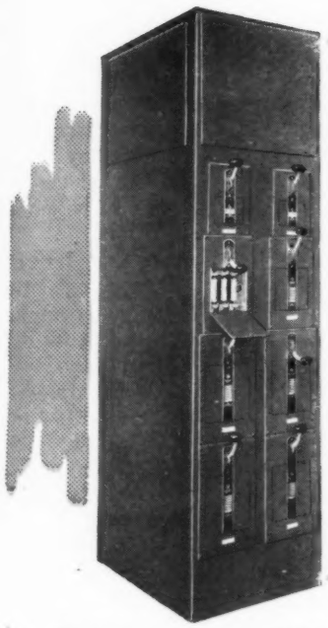
In my opinion, most of the bills introduced into Congress in the past two years for the regulation of labor relations are futile, and some of them are very harmful. Take the Case Bill as an example. A great deal was said in favor of it because of a feature which permitted the employer to sue unions. It so happens that last time I took the census, employers could sue unions in 44 of the 48 states, and unions can be sued in the federal courts. The legislation permitting employers to sue unions would add nothing substantial to the generally existing laws of the United States. And likewise, the apprehension of the unions as to fear of a suit that has resulted from the Case Bill seems to me unfounded, because they can be sued now.

Another feature of some of the legislation that seemed to me to be futile, and perhaps even harmful, is

SHUTLBRAK SWITCHBOARDS

Make it Easy to

PLAN FOR THE FUTURE



(FA) DESIGNED for FLEXIBILITY . . . (FA) one-piece switchboard units can be conveniently arranged — singly or grouped. Removable end walls permit adding sections to either side.

(FA) SECTIONALIZED for EASE and ECONOMY of INSTALLATION . . . (FA) assembled and shipped ready for connection of main and branch circuit cables . . . reducing installation costs. Sections readily fit together . . . with built-in junction boxes at top plus removable covers.

(FA) TAILORED TO MEET YOUR EXACTING REQUIREMENTS . . . Number and capacity of (FA) Shutlbrak Switches provided *as specified by you.*

Switchboards like everything else must keep pace. They should be planned with an eye to the future. (FA) Shutlbrak Switchboards make it easy not only to provide adequately for present day needs, but for future expansion as well.

Each unit of these modern, safety-type, heavy duty switchboards is self-contained, with all switch units connected to the bus bars of that section. Each has a junction box built into the top of the panel so that any number of units can easily and quickly be joined side by side or otherwise arranged to fit available space.

The (FA) Shutlbrak Switch, the outstanding characteristic of this switchboard, embodies the latest design and construction for a high quality heavy duty industrial switch with quick make and break connections held under compression by a tempered steel spring in the shuttle enclosure and with (FA) Kamklamp fuseholders. All copper surfaces are silver plated for good and lasting service. All steel parts are either made of galvanized steel, or cadmium plated. Switches are of interlocking type.

If it is high quality heavy duty switching that you need, insist on (FA) Shutlbrak Switchboards — the switchboard for today and tomorrow!

EST. 1891 THE SIGN OF A BETTER JOB

Frank Adam

SHUTLBRAK

FRANK ADAM ELECTRIC CO.
ST. LOUIS, MO. U.S.A.

FOR PLANT MAINTENANCE AND PROTECTION
"Buffalo" DIAMOND MESH FABRIC
VERSATILE·ECONOMICAL·SAFE·ATTRACTIVE
The same Diamond Mesh Fabric used for fabricating "Buffalo Wire" guards, partitions, grilles and panels, is also furnished to hundreds of plants in ROLLS OR CUT PIECES for numerous purposes.
• Any standard width is adaptable to any near width without waste.
• After installed on a frame, mesh is rigid and permanent.
• Smooth wires for safety.
• Deep crimped-uniform.
• Requires no painting or rust-proofing. Woven from galvanized wire (at no extra cost).
• Mesh sizes for every use.
Folder 602 tells how to measure, how to specify, types of installations. FREE ON REQUEST.
MANUFACTURERS OF ALL KINDS OF WIRE CLOTH FOR 75 YEARS
Buffalo WIRE WORKS CO., INC.
ESTABLISHED 1869 AS SCHEELER'S SONS
440 TERRACE BUFFALO 2, N. Y.

NEW
AIRETOOL'S IMPROVED RIGHT ANGLE GEAR DRIVE FOR TUBE EXPANDERS
Features—One-piece housing drilled and machined from solid bar steel—all moving parts completely inclosed with One-Shot long lasting lubrication.
Airetool's new right angle gear drive, ruggedly built for long service, is designed to reach those hard-to-get-at places. Sizes for 1/2", 3/4" and 1" drives. Write Dept. M for complete information.
AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

the proposed fact-finding boards. Obviously the name is a misnomer. From the arbitrator's point of view, it isn't fact-finding. Ninety-nine times out of a hundred, the facts are known to both parties. The differences are in the conclusions that are drawn from the facts. I think that some of our union friends perhaps may be right when they say that mere statutory delay to operation of a fact-finding board is not necessarily a cooling-off period — it may be a warming-up period. And I can see no particular advantage to be gained by that type of legislation.

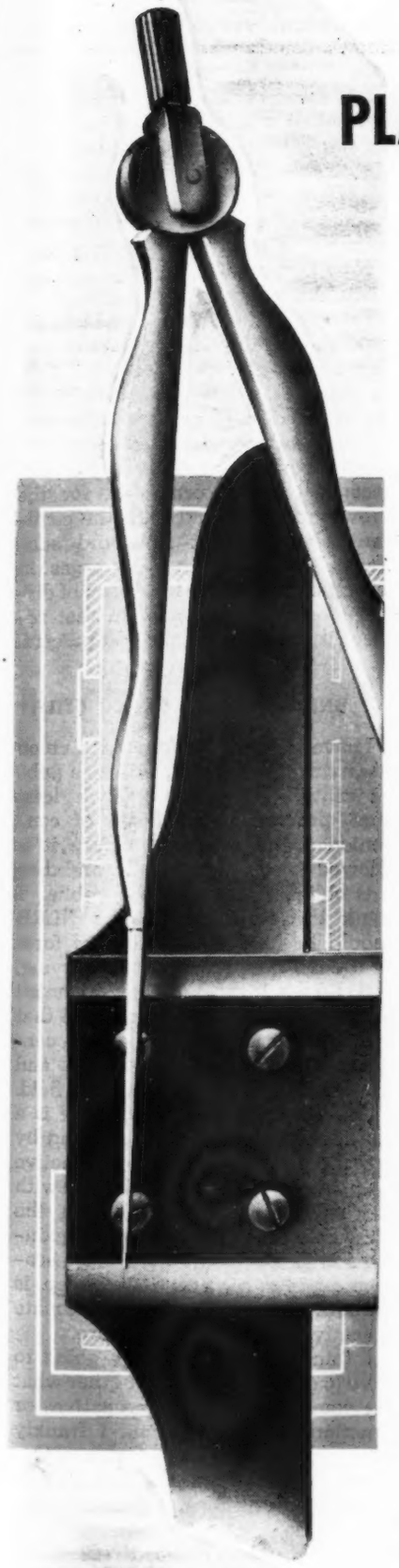
The first suggestion that I would have to make on federal legislation is that there ought to be a complete reorganization of federal code. If such a code should be adopted, there are several obvious principles of reorganization of the present law that should be incorporated in it. In the first place, comparing particularly the Wagner Act and the Wage and Hour Law, there should be a far more consistent definition as to who is covered. The Wagner Act covers the employer whose business affects interstate commerce. The Wage and Hour Law covers the employee who is engaged in, or producing goods for, commerce. Now, perfectly obviously, the test is different in each. In the Wagner Act, it is the employer. In the Wage and Hour Law it is the employee.

CHANGE IN WAGNER ACT

Now in a reorganization I would suggest that the Wagner Act be taken substantially as it is. Insofar as it states fundamental rules of law, it was not particularly revolutionary at the time, and I can see even from an employer's point of view no particular objection to the requirement of bargaining with employees when they request it, and to the other provisions that have been set forth in the act.

I would suggest two or three changes, however, that are correlative to the principles of the Wagner Act. One is the duty on the part of the union to bargain collectively. I think that if it is the obligation of employers to bargain, it is likewise the obligation of employees to bargain upon any subject of mutual interest, or within the allowable area of collective bargaining.

I should like to see the provisions, with regard to what the employer can say with respect to telling his story, relaxed somewhat, and clarified. Thus far the doctrine of freedom of speech of the employer has been kicked around by the boards in an entirely

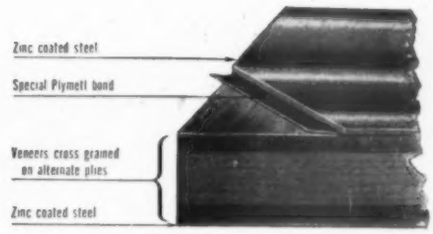


PLAN WITH Plymetl

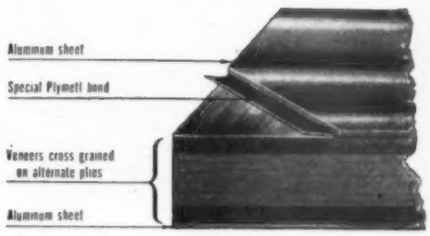
MAKES BETTER PRODUCTS POSSIBLE

Plymetl combines the light weight and rigidity of plywood with the strength of metal. Through 25 years of performance, Plymetl has proved its versatility, durability and dependability. When the War created shortages in supplies of critical metals Plymetl received still greater attention and wider use. Here Plymetl's performance in military equipment proved its worth as a basic structural material. For many applications Plymetl is unsurpassed. Where your product design requires a flat smooth surfaced material of unusual strength and light weight, a material unaffected by moisture and mold and fungi — and rust resistant — SPECIFY PLYMETL. A few of the more widely used types of Plymetl are described and diagramed below.

PLYMETL VE and EVE — A plywood plaque with zinc-coated steel sheet permanently bonded by an exclusive Haskelite method to one (VE) or both faces (EVE). Plymetl panels may be obtained in a range of thicknesses and sizes to suit specific applications. Simple wood-or-metal working tools will fabricate Plymetl.

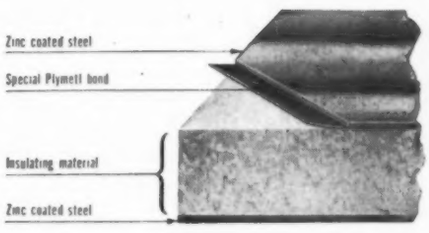


PLYMETL VU and UVU — A plywood plaque with aluminum sheet permanently bonded to one (VU) or both faces (UVU). The great strength and light weight factors of plywood are combined with the light weight of aluminum. Plymetl may be formed to certain curvatures.



PLYMETL ESE — A panel of insulating material with metal sheet permanently bonded to both faces (ESE).

Other types of core materials may be used to make varied kinds of Plymetl. To these cores, metal faces of monel metal, porcelain enamel steel, and stainless steel can be bonded. A core material may be faced with one type of metal on one side and another type on the other side. On all Plymetl panels, the metal faces provide an ideal surface for finishing.



Write for complete data on Plymetl, and bulletin SC45 which gives details on other types of Haskelite materials. Let Plymetl and Haskelite engineers help you design and build products that look better . . . sell better . . . and perform better.

HASKELITE

Dept. MM-6, Grand Rapids 2, Michigan

New York Chicago Detroit Philadelphia St. Louis Cleveland Los Angeles

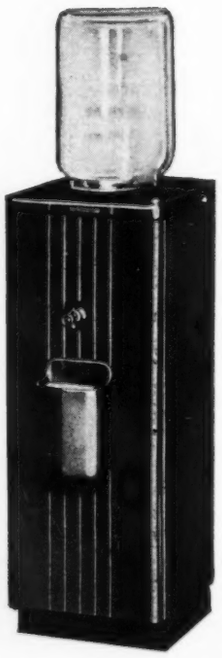
Canada: Railway & Power Engineering Corporation, Ltd.

"Gentlemen, ladies . . . wait until we get the G-E Water Cooler installed—please!"

DON'T BLAME your employees if they're eager to have the G-E Water Cooler installed. A new G-E Water Cooler is a wonderful present from the boss.

This grand morale booster costs so little — an approximate average of 2¢ a day. Little or no worry about repairs either, when you get a G. E. The stainless steel G-E tank protects against rust and corrosion, and the rugged G-E motor is dependable under constant use.

Call your G-E Dealer today. He's listed under "Water Coolers" in the Classified Telephone Directory. He'll supply you with a G-E Water Cooler as soon as he can make delivery. *General Electric Company, Air Conditioning Department, Section 67212 Bloomfield, New Jersey.*



GENERAL ELECTRIC

Water Coolers

inconsistent manner, and no one knows exactly what it is.

A third point, which I think certainly should be defined, is an American policy with respect to the act. I am not going to expatiate upon that, but it should be clearly stated, and not left to the opinions of temporary members of a federal board. It should be made a matter of public policy.

Now I come to the new points that I would suggest.

I would define in a federal law the legal and the illegal objectives of economic pressure, of concerted action. In doing that, I would make illegal the application of economic pressure in connection with representation cases. The Wagner Act was adopted, according to its preamble, for the avowed purpose and with the confident promise that it would substantially reduce the stoppages in interstate commerce by reason of disputes or representation. In that respect it has failed almost 90 percent.

UNION AKIN TO PUBLIC UTILITY

I have suggested before that a union is a natural monopoly, akin to a public utility. The public utility at least must procure a certificate of convenience and necessity before it is allowed to serve the public, and then it is obligated to serve the public. I think the certificate of the NLRB should be in exactly the same form as a condition precedent to serving, and when it is granted, then the union must serve. And I would make that certificate somewhat similar to a certificate of public convenience and necessity in the public utilities field.

And then again, I think there is a considerable problem in defining by law the allowable areas of collective bargaining. I would couple that with the rule that anything within the allowable area of collective bargaining is a legitimate objective of economic pressure, and that which is without the area is not a legitimate objective of economic pressure.

I think we are probably going to have to define some way or other what are commonly called prerogatives or functions of management. I frankly confess that I am not capable of defining it to suit myself, but I think that sooner or later it is going to have to be done.

[*Editor's Note*: Edward T. Cheyfitz, while he was chairman of the United Mine, Mill, & Smelter Workers-CIO, attempted to answer this question for Toledo's Labor-Management-Citizen's Committee. (Cheyfitz is now associated with Eric Johnston in the

GRINNELL PIPE HANGERS AND SUPPORTS

There is a standard or special purpose Grinnell Hanger for any piping installation – from a simple water pipe to a high pressure, high temperature steam line.

Not only do correctly engineered hangers save you valuable installation time, but they also provide such definite advantages as • *Easy adjustment during and after pipe erection* • *Full provision for thermal movement where necessary* • *Easy maintenance* • *Compliance with all piping code requirements.*

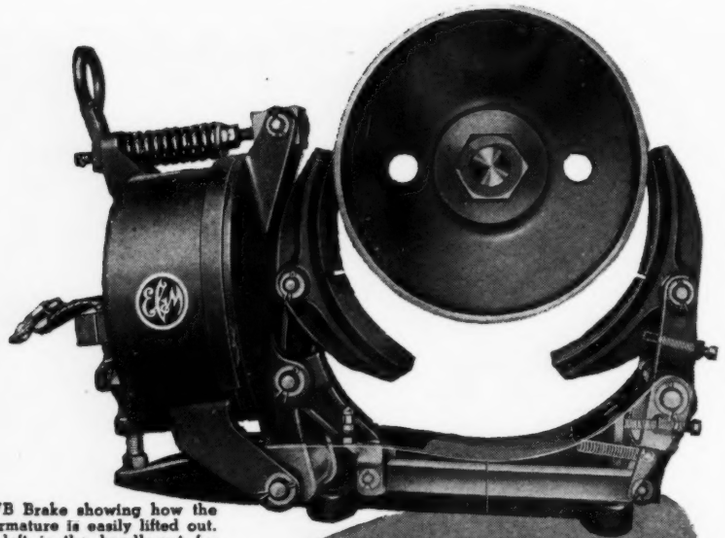
Don't waste time and take chances with inadequate pipe hangers and supports – let Grinnell supply the exact hangers to meet your needs.

GRINNELL COMPANY, INC.
Executive Offices: Providence 1, R. I.

Branch Warehouses

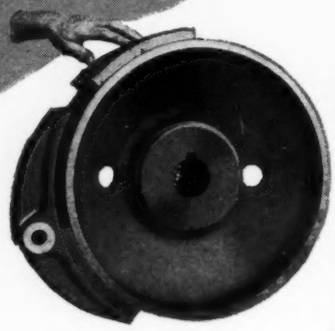
Atlanta 2, Ga.	Los Angeles 13, Cal.	Providence 1, R. I.
Charlotte 1, N. C.	Minneapolis 15, Minn.	St. Louis 10, Mo.
Chicago 9, Ill.	New York 17, N. Y.	St. Paul, Minn.
Cleveland 14, O.	Oakland 7, Cal.	San Francisco 7, Cal.
Houston 1, Tex.	Philadelphia 34, Pa.	Seattle 1, Wash.

GRINNELL
FOUNDED 1850
WHENEVER **PIPING** IS INVOLVED



Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.

Long Life Brakes for A-C and D-C Motors by EC&M

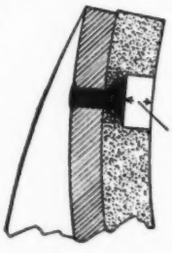


The brake lining is molded to match curvature of wheel and shoe.

These Type WB Brakes for a.c. and d.c. service have a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness* permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

EC&M Type WB Brakes are built in several sizes. They can be supplied with series or shunt-wound operating coils for direct current motors. On alternating current service, they are supplied in shunt-wound form for use with a compact rectifier-unit. Send for Bulletins 1004 and 1006 describing these long life brakes.



Actual wearing thickness, between rivet heads and brake wheel, is 1/16" on the smallest size to 1/2" on the largest size.

EC&M

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

motion picture industry.) Said Cheyfitz in 1945:

"In any sphere of activity . . . management retains the initiative. "Applying this . . . to the practical problem . . . we find management retains the power: To hire; to fire; to assign work; to direct the working force; to bring together men, materials, and equipment in efficient production; to discipline; to promote managerial positions; to administer every managerial technique necessary to production.

"Labor on the other hand retains its right to grieve and to seek redress of any wrong resulting from the initiative of management."]

Again, there is a tendency, commonly blamed upon unions, but I think not altogether correctly so, to evolve a considerable variety of clauses in collective bargaining agreements which are not in the public interest.

They are of two types. One is of the type commonly called the "make work" rules. These consist of restrictions on technological improvements in processes and machinery, restrictions upon the use of prefabricated products, restrictions requiring the performance of unnecessary work, requirements for the hiring of unnecessary men, and sometimes in the payments to the unions of monies disassociated from the rendition of any services.

The latter touches upon the welfare fund problems, and whether or not that is a legitimate objective of collective bargaining is something, I think, upon which the public should seek information.

RIGHT TO STRIKE

Another group of collective bargaining contracts that are likewise contrary to the public interest are those which are being increasingly denounced under the anti-trust law. Some bargains fix prices of things directly. Some of them provide and have provided the bid depository coupled with price formulas. Another type restricts the number of competing employers and prevents the inauguration of new businesses.

Now contract clauses of that type do affect the public interest. In 1941 the economists of the Department of Justice issued their statements that contract clauses in labor contracts which had nothing to do with hours, wages, or conditions of labor, were costing the American public $1,000,000,000 a year.

Another thing that I think should certainly be inquired into is the limi-

How do you evaluate your supplier?

WILL the product do the job? Will you receive the material in good condition? Will you get what you ordered? What kind of delivery can you expect? What is the supplier's past record?

These are some of the factors which should help you evaluate the worth of your supplier. Consider, too: the courtesy of the salesman who takes the order . . . how quickly he can give you information you need . . . his understanding of your problems . . . and his effort to help you earnestly.

We, in the Levinson organization, understand the importance of these vital factors in your everyday buying of supplies. Those in the habit of dealing with Levinson Steel Sales know that the answers to these questions are not merely a problem to us—they are a lifetime policy.

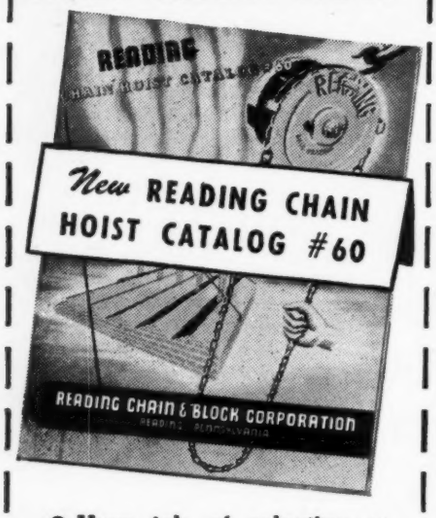
LEVINSON STEEL SALES CO.

PITTSBURGH, PA.

LSS-4

STRUCTURAL SHAPES · PLATES · CHECKER PLATES · SHEETS · STRIP · HOT ROLLED AND COLD FINISHED BARS
REINFORCING BARS . . . *also* APS PLASTEEL ROOFING · BATES OPEN STEEL FLOORING · THORN STEEL WINDOWS

For COMPLETE Hoist "KNOW-HOW"



● Your job of selecting a hoist for materials handling in your plant is important.

It's important because the hoist you select should "pay its way" through efficient, low cost operation. And before any hoist can pay for itself, it has to be the right one for the job.

To simplify your job of selecting the right hoist, we have prepared a new Reading Chain Hoist Catalog. 40 years of successful hoist engineering lie behind its 32 pages of information on hoist applications, construction details and installation methods. This complete hoist "know-how" is yours with the new Reading Chain Hoist Catalog No. 60. Write today for your copy and full details on the Reading Hoist Line.

READING CHAIN & BLOCK CORPORATION
2103 ADAMS ST., READING, PA.
CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

tation of the right to strike in certain vital industries, particularly in public utilities. Now in public utilities, an enterpriser who engages in the activity must render continuous service as a condition for his franchise. Once he fails to render that service, he loses his franchise.

Our economic situation is becoming so complicated that I think we are going to have, sooner or later, to enjoin the same obligations upon the employees, because if the employer has to render a service, the only way he can do it is through the cooperation of the employees, and the same dictates which compel the rule with respect to enterprisers, the entrepreneur, must likewise enjoin the same rule upon the employees, if the result is to be accomplished.

Now the price we shall have to pay for that is, I assume, government determination of the labor contract in case the parties fail to agree. I confess I view the prospect with no enthusiasm but it may turn out to be the lesser of two evils.

One thing that I certainly think is going to have to go into a labor code is to deny the right to strike against the government. If the power to coerce or to bring to its knees the federal government can be exercised by any union in a just cause, it can likewise be exercised by other groups in unjust causes.

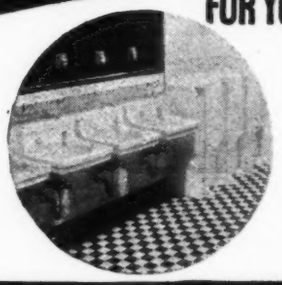
I would like to see a labor code which will make provision for the orderly conduct of the business of unions and employer associations. A lot of my employer friends become very enthusiastic over the requirement that unions should incorporate. The theory, as I understand it, is that if unions are required to incorporate, they will become more responsible. A lot of my union friends fight that off very virulently, because they think it will make them maybe too responsible.

UNIONS AS CORPORATIONS

The truth of the matter is that both of them, in my opinion, are exactly on the wrong side of the fence. To incorporate a union will not make it more responsible at all. At the present time, if you can sue a union for breach of contract, you can sue the union and its funds, and you can sue every individual in it who participates, and you can prove they are completely responsible so far as the group is concerned.

Corporations were formed, you will remember, primarily for the purpose of limiting liability, and that is one

A Magical DIRT and GREASE Remover FOR YOUR



WASHROOMS

WALLS AND WOODWORK

FACTORY FLOORS

For Every Factory Cleaning Job In

ELEKTRO-PURJ-IT All Purpose CLEANING COMPOUND

DISSOLVES IN WATER...
Costs Less Than 2c per Gallon

The proven choice of many as the better, faster CLEANER. Saves labor! Cuts cleaning costs! Added to water makes the proper strength solution for each cleaning job requirement. It's dustless, non-caking—deodorizes, freshens. Gentle for hands, surfaces. Ends need for dangerous fluids.

FREE SAMPLE
Sent on Request

TROJAN PRODUCTS Department
The Diversey Corporation
53 W. Jackson Blvd., Dept. E-10, Chicago 4, Ill.

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

A. O. Smith's new plant at Kankakee will have the largest radiant heating plant on record. Water, heated to 140 deg. by 120 separate heaters will circulate through 40 miles of pipe laid in the floor slab.

get ready with CONE for tomorrow

The making of acetylene from natural gas is being studied and reports may be expected from the Department of Commerce.

get ready with CONE for tomorrow

Muncie Gear Works proposes to market a "reverse cycle" heating plant this year.

get ready with CONE for tomorrow

Truck bodies of magnesium are being made by Barry and Bailey Co. of Philadelphia.

get ready with CONE for tomorrow

Blue Mountain Clay Co. of Memphis makes a new oil, grease and water absorbent for oily and wet floors that is said to absorb 120% to 140% of its weight.

get ready with CONE for tomorrow

The Public Health Service announces that satisfactory substitutes for mercury have been found that end the hazard of mercury poisoning (the origin of the term "mad hatter") in the hat making industry.

get ready with CONE for tomorrow

In a new thickness gage, designed by Glenn L. Martin Co., a dial registers the deflection of a sheet of metal when a predetermined vacuum is created on one side of it.

get ready with CONE for tomorrow

The idea of the variable pitch propeller has been applied to industrial fans by Evans Products Co. Operated by a built-in thermostat, it maintains constant engine operating temperature.

get ready with CONE for tomorrow

An electrically conductive, nonsparking linoleum has been introduced by Congoleum-Nairn.

General Electric has patented a new type of household refrigerator which maintains temperature at two levels simultaneously.

get ready with CONE for tomorrow

The Bureau of Mines has recently released information on its process for the electrolytic method of producing manganese.

get ready with CONE for tomorrow

Pullman-Standard has increased its output of car wheels ten times by using a machine which revolves the tool instead of the wheel.

get ready with CONE for tomorrow

National Tube Co. claims that its new plant at Lorain, Ohio, is the world's first straight-line seamless pipe mill. It produces 2,000 feet of seamless steel pipe per minute.

The Office of Technical Services of the U. S. Dept. of Commerce reports on a silver-magnesium solder that can withstand the heat of gas turbines.

get ready with CONE for tomorrow

"Multi-tule", a profile blade type form tool holder, is to be made available to users of a well-known make of multi-spindle automatic lathes. The holder is particularly adaptable to short runs and cuts down time in tooling change-overs. It reduces the number of holders ordinarily required for a number of jobs.

get ready with CONE for tomorrow

Dr. Baetjer, of Johns Hopkins University, prophesies that by 1950 one in every three women over fourteen will be employed in industry.

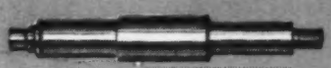
get ready with CONE for tomorrow

The *USS Salem* and *USS Newport News*, now being built, will be the first ships in what is promised to be a completely air-conditioned Navy.

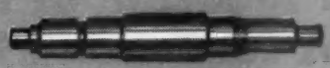
FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

Emphatically Conomatic!

25⅝" long, 16 operations in 63 seconds from 1⅜" dia. hot rolled.

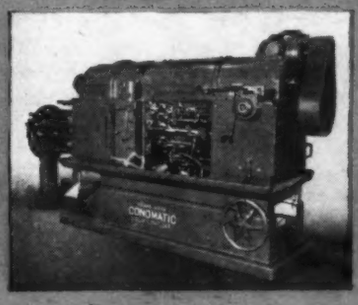


10⅞" long, 16 operations in 65 seconds from 1 41/64" dia. SAE 4620.



10⅝" long, 12 operations in 54 seconds from 1⅝" dia. SAE 3115.

Any good multiple spindle automatic should handle the ordinary run of shaft work. But Conomatics are also adaptable to the unusually *tough* jobs. The illustrations show this plainly.

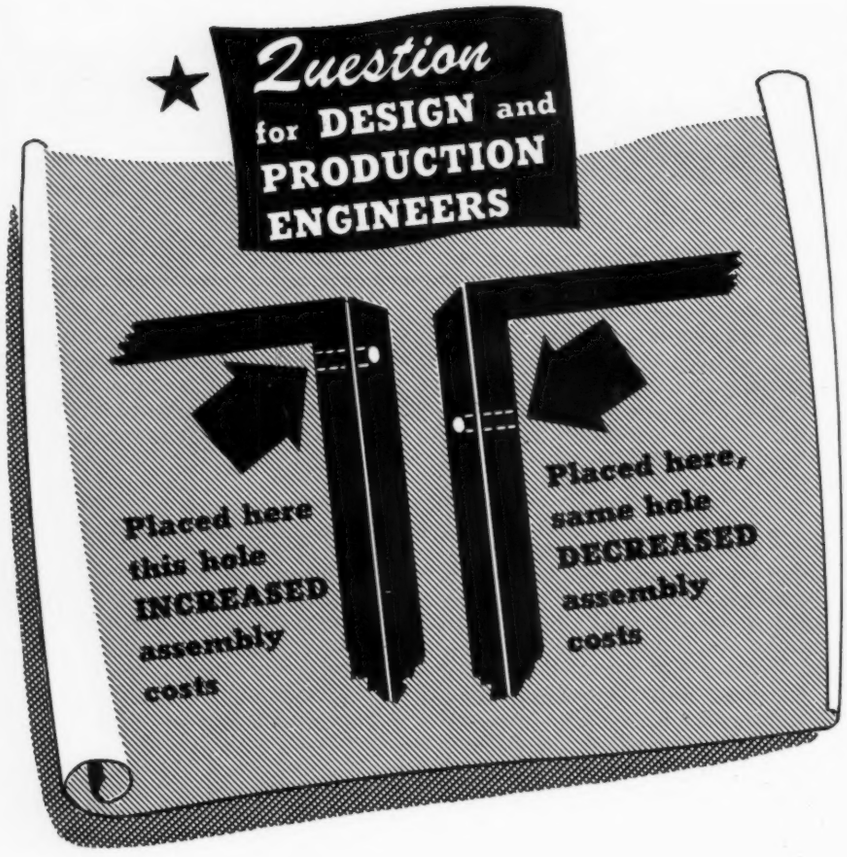


Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

35



★ What have assembly costs and to do with size or location of holes for fastenings?

MILFORD FASTENING EQUIPMENT

The connection is as close as the fingers of your hand.

A fraction of an inch one way in the size or location of a hole — and *standard* Milford fastening equipment can be used: *thousands of dollars added to profit.* A fraction of an inch the other way — and *special* Milford fastening equipment must be used: *thousands of dollars added to cost.*

To see how an assembly that apparently requires special Milford fastening equipment could be done faster and at lower cost with standard equipment comes from knowing all the mechanical possibilities of fastenings with rivets and rivet-setting machines.

Milford engineers will gladly share their vast knowledge of the intricate field of fastenings so that wherever possible, standard equipment may be used. (It's simply good business to keep customers' costs down.)

Even before a design reaches the drawing board, explore fastening methods with a Milford engineer. Consultation is in strictest confidence and without obligation.

THE MILFORD RIVET & MACHINE CO.

861 Bridgeport Ave. MILFORD, CONN.

1004 West River St. ELYRIA, OHIO

Inquiries may also be addressed to our subsidiary:

THE PENN RIVET & MACHINE CO., PHILADELPHIA 33, PENNA.

Designers and Manufacturers of: SPECIAL COLD-HEADED PARTS; SPLIT, SEMI-TUBULAR AND DEEP-DRILLED RIVETS; RIVET-SETTING MACHINES; SPECIAL MACHINE SCREWS AND SCREW MACHINE PARTS.

of the reasons we use them in business today. Why we have had all this commotion about incorporating unions for the purpose of increasing responsibility passeth my human understanding.

There will undoubtedly be legislation sometime on the question of admitting members to the union. The Supreme Court of California not long ago used this phrase: "There can be a closed union or a closed shop, but not a closed union and a closed shop." This directly reverses a 15-year old decision of the Supreme Court.

The type of legislation that I should like to see adopted with respect to the regulation of the affairs of unions is that primarily directed to defining the powers of the different elements of the strata of organized labor. What are the functions and powers of great federations? What is the function of the international, of the district councils, the state federation, the local organizations, and the business agents? That is very important in many respects, and not more important than in the field of deciding who has the authority to do what under the contract.

Which body is it that has authority to exercise powers under a contract? What authority do they have to determine policies of the union? To what extent can an international union, for instance, purge or discipline and on what grounds correct the affairs of a local union which may have fallen into corrupt hands, or may be having difficulties and bringing discredit upon the whole organization.

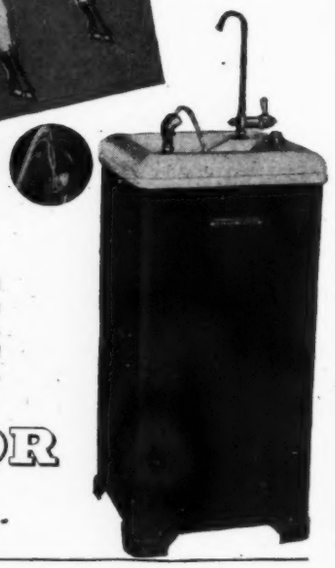
EMPLOYER ASSOCIATIONS

I think that a parallel set of legislation should be set up for employer associations. There is probably more interest in that in California than elsewhere since I think that out there we do far more industry bargaining within the labor market area. As a result there are fewer small disputes there than in the East. Where there is industry-wide collective bargaining, by and large a strike occurs only where there is a major conflict of interest.

However, so ill adapted are our laws on the formation of employer associations that we have to organize them under the statutes providing for charitable and educational corporations and have to pay special attention to tax matters. I don't know any reason why employers shouldn't protect themselves against stoppages by right funds in the same manner as

There is a Bunting Authorized Distributor in your area and he has Bronze Bars and Standard Stock Bearings on his shelves for immediate delivery. Bunting and Bunting Stock-Carrying Distributors combine to give you availability of truly fine, Quality Bearing Bronze. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.
Bunting
BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

Stellar Performance!



IN any season, the dependable performance of Halsey Taylor Coolers proves a star attraction to both management and workers alike. Workers, assured of a reliable source of drinking water supply, do a better job, and production stays at peak. Maximum sanitation and trouble-proof service through the years! Get our catalog. ***The Halsey W. Taylor Company, Warren, O.***

HALSEY TAYLOR

COOLER FOUNTAINS

F6

Used in

- INSTITUTIONS
- FACTORIES
- SCHOOLS
- OFFICES
- CAFES

LESS THAN 6¢ PER SQUARE FOOT

BIRD *Rubberlike

Ideal Protection For Heavy Traffic Areas

RUNNER CUTS FLOOR UPKEEP COSTS!

Wherever constant foot-pounding batters busy floors, Rubberlike floor runner fills the bill for low-cost, durable protection. This modern composition product has rugged corrugations that cushion and quiet footsteps ... it's a cinch to clean, needs no special maintenance, can be put down in a jiffy without cementing. Won't curl at edges. Water doesn't make it slippery — a boon where splashings or tracked-in mud are safety hazards. Used in thousands of heavy traffic spots — hotels, factories, institutions, schools, offices, cafes. In rolls 27 in. by 100 ft. or 36 in. by 75 ft. Order from Supply House or write for free sample to Bird & Son, inc., Dept. 612, East Walpole, Mass. *Reg. U.S. Pat. Off.

BIRD NEPONSET PRODUCTS

BIRD & SON, inc., EAST WALPOLE, MASS., NEW YORK, SHREVEPORT, LA., CHICAGO

the unions do. Yet the federal tax laws are such that if that were attempted there would be a serious hazard of having to pay income taxes on the whole thing.

I am simply trying to illustrate the following point. Unions have come to bulk very large in society. With us, employer associations are rising very considerably in the same category, and that is not over the opposition of unions, either. I think, therefore, that the law should make provision for the orderly conduct of these employer associations and unions, both of which are becoming increasingly important in society. It is only common prudence that that should be done.

BEHIND THE BYLINE

Facts About *Factory's* Authors

H. P. Dutton (page 121) is chairman of the Department of Industrial Engineering at Illinois Institute of Technology and a consulting editor for FACTORY. His background in the industrial field is long and distinguished. A graduate in Electrical Engineering from the University of Michigan, he has worked with such companies as Pullman Company, Wright-Martin Aircraft Corporation, Royal Metal Manufacturing Company, and Ideal Industries. He has had many years of editorial experience, is the author of several books and many articles, and formerly taught classes in factory management at Northwestern University. He is a member of the Association for the Advancement of Management, Society for the Advancement of Engineering Education, and many other technical societies and groups.

The president of Simplex Time Recorder Company, Curtis G. Watkins (page 94) grew up in the business, which was founded by his father in 1888. After leaving the School of Business, Columbia University, he

You Can COUNT ON VEEDER-ROOT to Build "COUNTROL" into Your Product or Process

. . . with either Standard or Special Veeder-Root Counting Devices

Take a rolling mill, a machine tool, jet plane, juke box — or what have *you?* Odds are long that there's a place ready and waiting, *though perhaps as yet undiscovered*, for Veeder-Root *Count*rol in your product-design and sales-promotion plans.

And now's the time to find out. Ask a "Counting House" engineer to count up the ways in which you can profit by building into your product or process the right Veeder-Root Device (standard or special) . . . like, for one instance, the standard Medium Size Rotary Ratchet Counter shown above.

Remember, too, that *Count*rol can profit your customers as well as yourself . . . can help to keep you on friendly terms by proving your product's guarantee. Find out just how much you *can* count on. Write today to Veeder-Root Inc., Hartford 2, Conn. *In Canada:* Veeder-Root of Canada, Ltd., 955 St. James St., Montreal 3. *In England:* Veeder-Root Ltd., Dickinson Works, 20 Purley Way, Croydon, Surrey.

Give your product this extra Merchandising Feature

DON'T jeopardize YOUR Materials Handling program with inferior pallets!

FOLLOW THE EXAMPLE OF INDUSTRY'S LARGEST USERS AND SPECIFY....

RUGGED NATIONAL PALLETS & SKIDS

SUPERIOR 'know-how' in construction makes every NATIONAL pallet an economical and serviceable load-holder that will last for years under the most demanding programs.

Because NATIONAL pallets are made of select moisture-controlled hardwood, specially cut right at the source of supply and assembled with the best, hardened-steel drive-screw nails, top materials-handling engineers know they can count on NATIONAL for the most RUGGED pallets on the market

See NATIONAL PALLETS in action, Booth 608, at the Materials - Handling Exposition in Cleveland, Jan. 14-17.

Write for illustrated folder

Representatives in principal cities

NATIONAL PALLET CORP.
Berger Building Pittsburgh Pa.

Active Member Materials-Handling Institute

was on the road for 14 years—from coast to coast, as well as throughout Mexico, Canada, and Cuba. He became sales manager, then vice-president. During recent years his time has been taken up with management problems, but his chief interest has always been selling. Regarding hobbies, Watkins admits that he doesn't have much time for them and says that truthfully his only real hobby is his business.

For the past 12 years, Robert B. Burton (page 96) has supervised all electrical construction and maintenance, as well as all electrical work on production assemblies, at Liquid Carbonic Corporation. Graduated from Lewis Institute, he has kept abreast of recent theory in his field with night courses in electrical engineering and electronics. He has been a member of the International Brotherhood of Electrical Workers for the past 28 years, and also Post Master of Chapter 1, Chicago Electrical Craftsmen. He is a registered electrician and registered professional engineer. Some of the large Chicago loop buildings were under his supervision while under construction, including the Board of Trade Building and the DePaul University Building. His chief interest (aside from six grandchildren) is first-class workmanship on any electrical installation, as well as any improvement in the industry as a whole.

The special interest of K. D. Hartman (page 114) is simplifying lubrication with systems, schedules, and carefully planned techniques. He believes that all industries, regardless of the number of machines or bearings to be lubricated, can perfect a lubrication routine that will reduce work and eliminate trouble. His hobby is collecting books on lubrication and chemistry, and he is an avid reader in these subjects. Recently he was elected Chairman of Standardization in the American Society of Lubrication Engineers.

Widely Used to Keep Count!

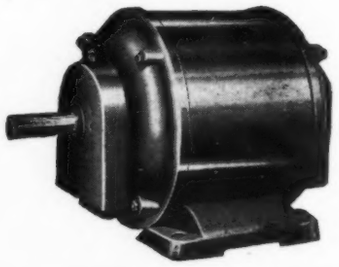
Industry's favorite "Watchdog of Production" since 1906 . . . Redington Counters are *widely used* on punch presses, pumps, screw machines, packaging machines . . . conveyor lines, can making and box making machinery . . . in fact *all types* of machinery . . . and production lines. Easy to install . . . *100% accurate*. Write for new catalog.

F. B. REDINGTON CO.

105 S. Sangamon St. Chicago 7, Ill.

Before you specify
ANY MOTOR, *check these* VALLEY ADVANTAGES

- Wide Adaptability —sizes ½ to 75 h. p.
- More Flexibility in power planning
- Takes Unusual Power Loads
- Drip-Proof...Splash-Proof
- Economical Operation
- Cool
- BALL BEARING



Valley Electric Corp.
4221 Forest Park Blvd. • St. Louis 8, Mo.

Candy for cows cools off on rubber

A typical example of B. F. Goodrich improvement in rubber

Cows love 'em, and give out more milk when they're fed those soybean-and-molasses wafers.

The trouble was the wafers were too expensive to make. Mixed and shaped in an oven, the hot pellets were dropped onto a moving rubber belt to be cooled and carried to packaging machines. But the heat and the vegetable oil in the "candy" attacked the rubber belts, made the belts swell and break into pieces in sixty days or less. Besides the cost of new belts, the plant had to shut down, production was lost.

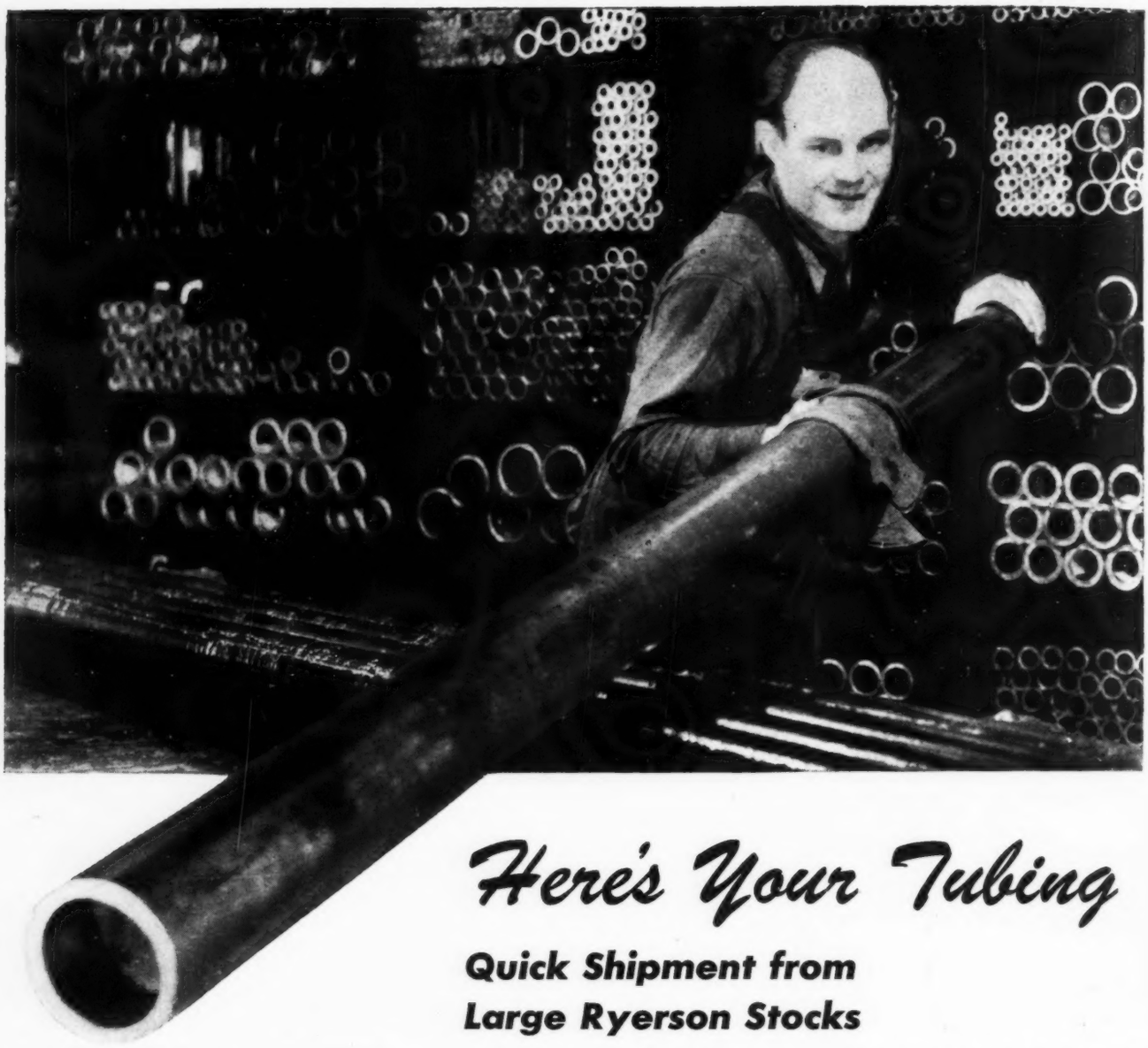
B. F. Goodrich engineers, who had designed special belts for almost every possible service, went to work on this one. They developed a synthetic rubber which resists oil, and found compounds which, added to it, enable the rubber to stand the 180° heat of the oily wafers.

Belts of this new BFG compound were made. Today they have been in use not 60 days but 6 months and still look as good as new. They have already carried 31 million pounds of the hot, oily "candy for cows" without a single stop or a moment's time loss.

Production has been continuous, repairs have been eliminated, costs have been reduced — typical advantages of the B. F. Goodrich development which is applied constantly to every rubber product. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich

RUBBER *and* SYNTHETIC *products*



Here's Your Tubing

Quick Shipment from Large Ryerson Stocks

It's just what you ordered because we continually check the size-accuracy, concentricity and straightness of our tubular stocks.

Its surface is smooth and scale-free because close control over every manufacturing step, from selection of the highest grade billets, through piercing and drawing, to the finished tube, assures a top quality product.

You'll find that constant experimentation to improve machining qualities has paid off in good machinability within the limits of the analysis specified. In short, nothing is overlooked that will help you put this tubing to work as a finished part, quicker and with less waste.

Convenience is another advantage of Ryerson service on tubular products. Large, diversified stocks are on hand for prompt shipment in eleven completely equipped plants . . . providing next-door service most everywhere.

A Ryerson tubing specialist will work with you on all tubular requirements. Get in touch with the plant nearest you when you need tubing from stock.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

IN STOCK

Low Carbon, Cold Drawn Seamless Mechanical Tubing
Regular and Pump Cylinder Finish

High Carbon, Cold Drawn Seamless Mechanical Tubing

Structural Tubing—Hot Rolled, Butt Welded

Boiler Tubes—Seamless and Electric Resistance Welded

Allegheny Stainless Seamless Tubing—Type 304

Allegheny Stainless Seamless Pipe
Type 304—Standard and Extra Heavy Weight
Types 316 and 347 Standard Weight

Allegheny Stainless Welded Pipe
Type 304—Standard Weight

Hot Finished and Cold Drawn Alloy Steel Tubing and Aircraft Quality Tubing Available from Mill Only.

RYERSON STEEL

Power Apparatus

FOR YOUR PLANT OR PRODUCT

Graybar distributes G-E Motors, Controls — switchgear — other apparatus — and offers specialized, local service

Whether you're looking for a 100-hp. motor for your plant or a 1/100-hp. motor component for your product, your best bet is to call the near-by Graybar office. That goes, too, for other power apparatus.

We distribute G-E motors and motor controls, both integral and fractional horsepower sizes. Look to Graybar, too, for the equipment you need to distribute power safely within the plant — transformers, switchgear, circuit breakers, capacitors, etc.

Some electrical items are still unavailable anywhere. so we may not be able to supply exactly what you want — right away. But, as production is increased, you'll find more and more that Graybar service is outstanding for speed, efficiency, and helpfulness. A Graybar Specialist is ready now to help you or your electrical contractor in planning any installation of wiring, lighting, communication apparatus, ventilating equipment, or anything else electrical. *Graybar Electric Company. Executive offices: Graybar Building, New York 17, N.Y.*

4633

IN OVER 90 PRINCIPAL CITIES

Everything Electrical via Graybar

SHELL METAL-WORKING OIL gives 25% increase in PUMP CYLINDER HONING

PROBLEM: Honing of large reciprocating pump cylinders 20 inches in diameter and 4 feet in length was "going slow" because metal particles were loading the hones . . . glazed hone surfaces produced an inferior product finish.

SOLUTION: When the Shell Lubrication Engineer surveyed the problem, he recommended the use of a Shell cutting oil, cut back for optimum flushing and cooling action. Improvement in the honing operation was immediately evident. A finer finish was produced, *and production was increased by 25 per cent.*

CONCLUSION: It pays to consult the Shell Lubrication Engineer, regardless of the nature or size of your lubricating problem. Write for informative literature on Shell Metal-Working Oils. Shell Oil Company, Incorporated, 50 W. 50th St., New York 20, New York, or 100 Bush St., San Francisco 6, Calif.

SHELL METAL-WORKING OILS

For every metal . . . for every operation

SHELL

HANDLING 180 TONS PER DAY A BAKER TRUCK CAN SAVE $59.51

● Handling conditions vary for each particular plant. Your own problem should be presented to an experienced material handling engineer. However, the following example outlines a simple method for determining the savings possible with an electric industrial truck. Let us assume a hypothetical plant with the simple problem of transporting daily 180 tons of material 200 feet from stockrooms to processing machines. Without power trucks this would require 10 truckers, each making 10 round trips per hour, or 80 trips per day, carrying 450 lbs. of material per load.

TABLE I—*Handling Costs Without Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (85¢ per hour)	$68.00	$0.378
Social Security Taxes	2.72	0.015
Workmen's Compensation	1.00	0.006
Hand Truck Depreciation	0.30	0.002
Total	$72.02	$0.401

COST OF MATERIAL HANDLING

Per ton—based on 180 tons per day

WITHOUT TRUCK

In addition to these savings, Baker Trucks reduce warehouse rental charges by tiering, contribute to plant safety, speed production and material movement, and perform many other operations that reduce plant overhead.

WITH BAKER TRUCK

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2178 WEST 25TH STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

In order to mechanize handling operations, the following equipment would be required:

TABLE II—*Cost of Equipment for Mechanizing*

Fork Lift Truck 2000-lb. capacity	$4,100.00
Battery	600.00
Charging Equipment	840.00
200 pallets	700.00
Total	$6,240.00

The truck, handling one-ton pallet loads of material, making 24 round trips per hour, could transport the 180 tons in 7½ hours.

TABLE III—*Annual Expense—Truck Operation*

Depreciation—Truck at 10%	$410.00
Battery at 20%	120.00
Charging equipment at 6⅔%	56.00
Pallets at 20%	140.00
Tires	100.00
Repair and Maintenance—Truck	164.00
Battery	24.00
Charging Equipment	33.60
Replacement of damaged pallets	70.00
Electricity	82.00
Insurance	10.00
Total annual expense	$1,209.60
Expense per day	4.03

TABLE IV—*Handling Costs—With Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (Driver—$1 per hour)	$8.00	$0.044
Social Security Taxes	0.32	0.002
Workmen's Compensation	0.16	0.001
Truck Expense	4.03	0.022
Total	$12.51	$0.069

TABLE V—*Savings With Electric Truck*

Savings Per Ton	$ 0.332
Savings Per Day (Handling 180 tons)	59.51
Savings Per Year (300 days)	17,853.00
Per cent Reduction in handling costs	83%
Annual earnings on investment	286%

While this example is obviously oversimplified, Baker Material Handling Engineers are prepared to show you how similar savings can be made on handling operations in your plant.

DO DOZENS OF JOBS *FASTER... CHEAPER...* with LORAINS!

MOBILITY to cover ALL your yards ... versatility to do ALL your handling jobs—that's what you can get in a single Lorain Crane! Shown on this page are just a few of the dozens of jobs Lorains do faster, cheaper. Because you can use a Lorain so many ways, it's sound basic economy to invest in one today. Any one of these high performance machines can be used with 15 different attachments to handle almost any material you can name. That's where Lorain versatility comes in.

Then, too, there are three basic types of Lorain Cranes—two-speed Crawler for semi-stationary work; rubber-tired Self-Propelled Cranes for high local mobility (speeds to 7 MPH); and rubber-tired Moto-Cranes for unrestricted mobility between plants (speeds to 31 MPH). That's the broad range of choices you have for the kind of Lorain mobility you need on your job.

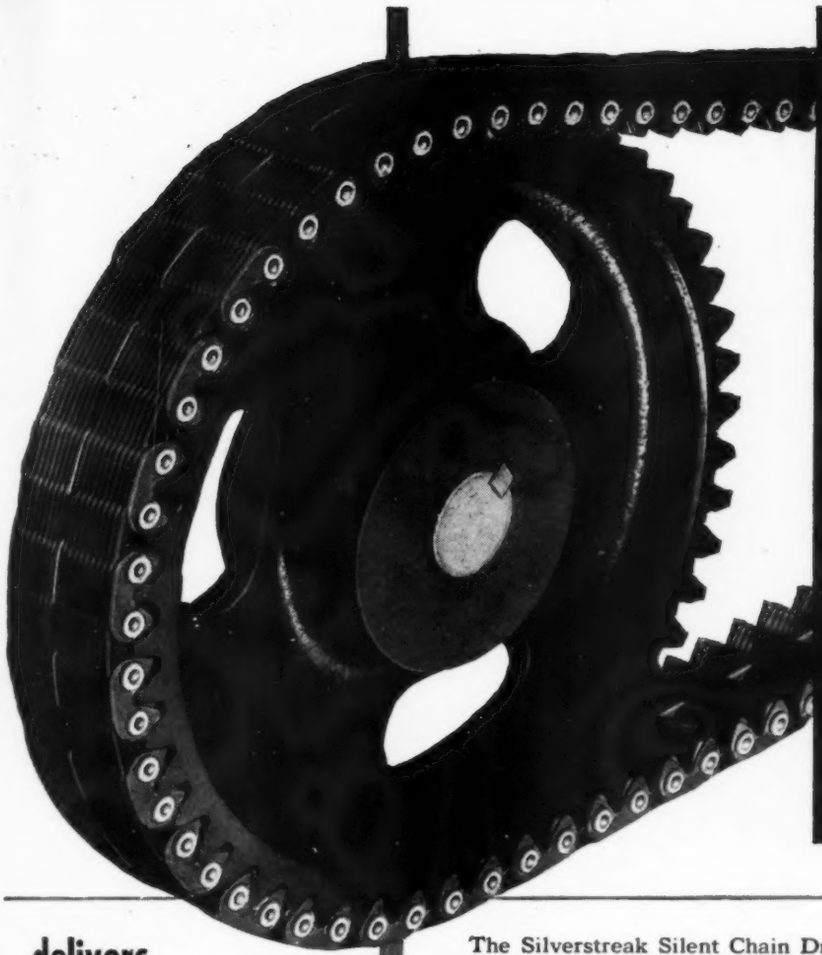
Let a Lorain distributor show you today how a modern Lorain Crane with the right type of mounting and the proper boom attachments can cut your handling costs . . . and do the job faster! He can give you exactly the right combination—because he *has* it.

Reg. Trade Mark

thew-Lorain

THE THEW SHOVEL COMPANY
LORAIN, OHIO

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES



..check these advantages of LINK-BELT Silverstreak Silent Chain against your needs

delivers rated capacity.....

The Silverstreak Silent Chain Drive is flexible as a belt and positive as a gear. Production output checks with the actual rated capacity of the machine, as the drive is not dependent upon frictional contact. There is no slippage.

saves space.....

Silverstreak Silent Chain Drive conserves space because it operates over small wheels on short centers. Available in all sizes from 3/16" to 2½" pitch.

long life.....

Entirely constructed of steel, Link-Belt Silverstreak Silent Chain Drives, when properly encased and lubricated, will give years of uninterrupted service with minimum maintenance.

easy to change.....

If you should want to change speeds, it can be quickly accomplished by changing the diameter of the driver or driven wheel. Link-Belt Silent Chain can be easily disconnected by removing only one pin and two segmental bushings.

economical.....

The economy of Link-Belt Silverstreak Silent Chain Drive is expressed over its dependable and carefree service. For pertinent design and application information, we will be pleased to send Data Book No. 125 upon request.

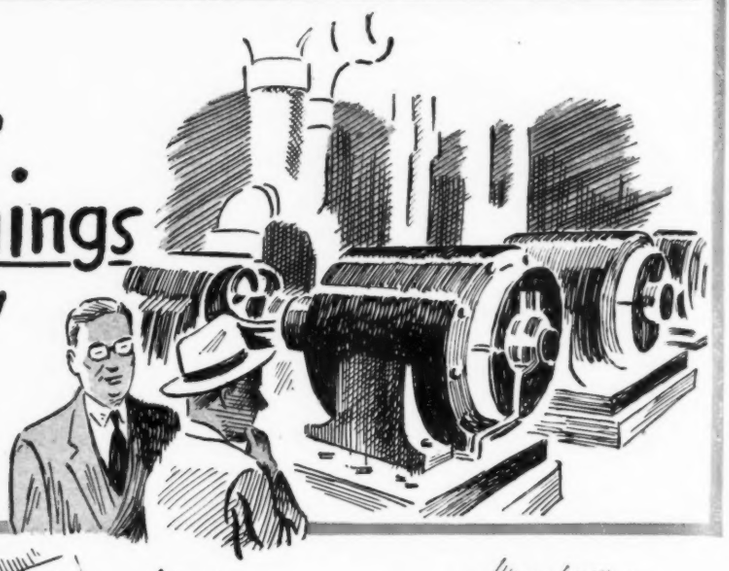
LINK-BELT
Silverstreak
SILENT CHAIN DRIVE

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities. 10,383

"For This Job, Give Me Two Things in a Motor"

. . . said the Power Plant Engineer



"To Drive Boiler Feed Pumps, motors must first be *simple*. For example, take these three Allis-Chalmers 800 hp, 3600 rpm motors. They're 2-pole, squirrel-cage, single winding machines . . . with practically fool-proof rotors and sleeve bearings. But second, and even *more* important . . .

They've Got to be Dependable! Here's what I mean. These same motors have given us 17 years of uninterrupted service. We've had to order replacement parts for them only twice . . . at a total cost of less than $12 a year. We call that *good performance* . . . the kind we've come to expect of *all* your motors!"

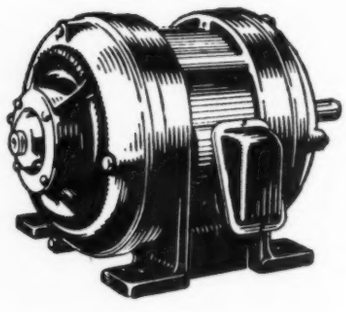
Frankly, Mr. Reader, we *are* mighty proud of our 2-pole motors. We've been developing them for high-speed requirements like this from the very earliest. Licked a lot of problems too. Like cutting down noise through better design . . . reducing windage noise with proper baffling, and curbing magnetic noise. . .

We're Getting Better Efficiencies and power factor . . . and lower starting kva, through improved squirrel-cage design. We've designed bearing brackets generously for greater structural rigidity. In fact, all the way around you can expect to find long life and low maintenance built-into our motors!

Yes, "A-C" Means Long Life in Motors!

REGARDLESS of size or type you'll be money ahead with Allis-Chalmers motors. For at A-C you can expect and *get* the same careful engineering, generous design and long-life operation that thousands of motor buyers have come to rely upon through the years.

And remember . . . while many jobs call for special or modified motors, there are *many more* that can be solved with *standard* motors . . . at less cost . . . and often with saving in time! ALLIS-CHALMERS, MILWAUKEE. A 2082

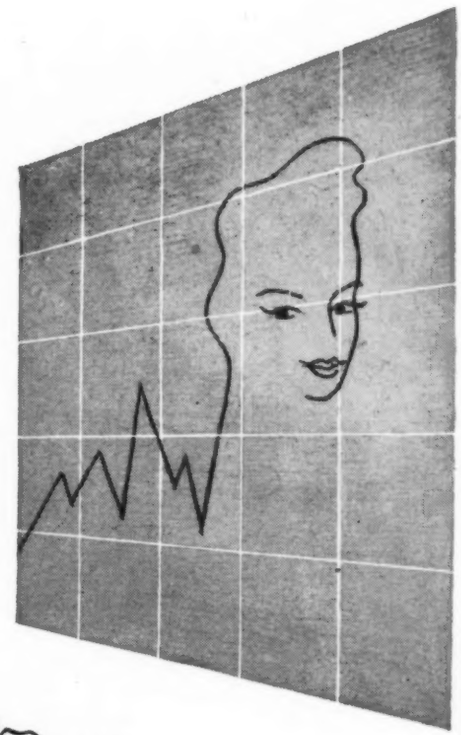


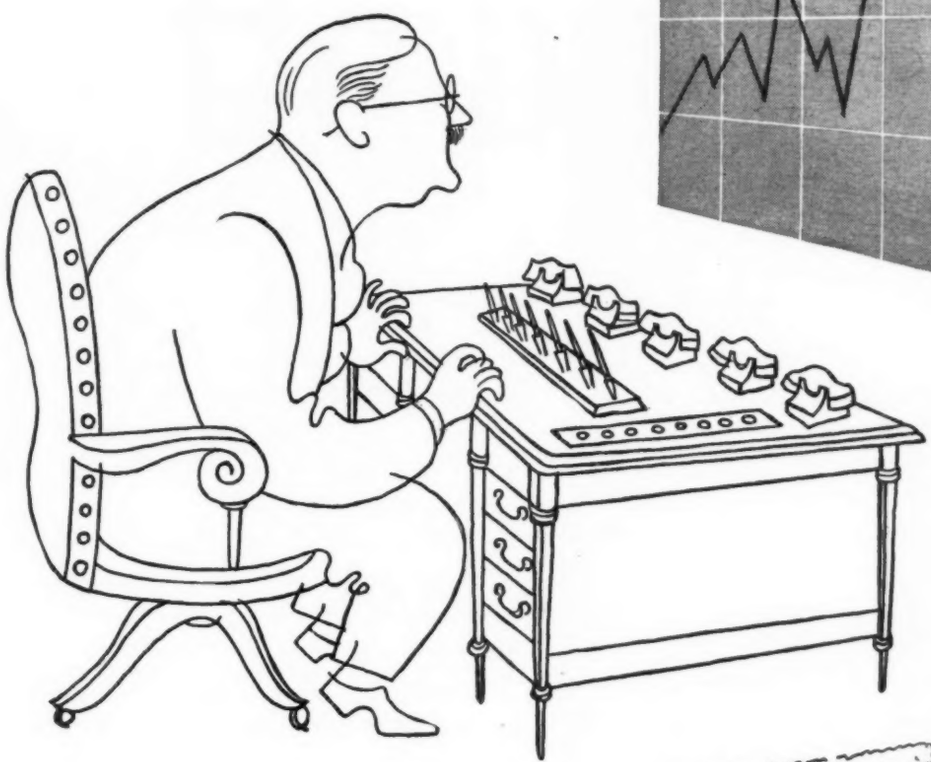
ALLIS CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

Dear Tycoon

Rest your mind a moment and think about Mrs. Tycoon, and how wonderful she will think you are if you give her perfume this Christmas. For instance, Taglio—the beautiful new Lucien Lelong fragrance. It's really quite something; not exactly!!!!!!—but still it's!!!!!! Well, back to work.





Taglio PERFUME

LUCIEN LELONG

The brush-off that paid off

A SHORT TIME AGO one of our salesmen got the brush off; he lost an important order that he was very anxious to get. He had helped work out a method of using Osborn brushes which increased his customer's operating efficiency. The customer adopted the idea but he bought a competitor's product because Osborn's price was, or so it seemed, 50% higher.

Our man found it pretty hard to believe that his price was so far out of line, so he did some investigating. Osborn's price was indeed higher (47¢ per brush section as against 30¢)—*but operating comparisons showed the Osborn brushes gave three times the service.*

The legitimate comparison therefore was 47¢ against 90¢, in Osborn's favor. That original "brush off" is going to pay off now—for both Osborn as supplier and the Customer as user—because it caused the investigation which showed up the true costs involved.

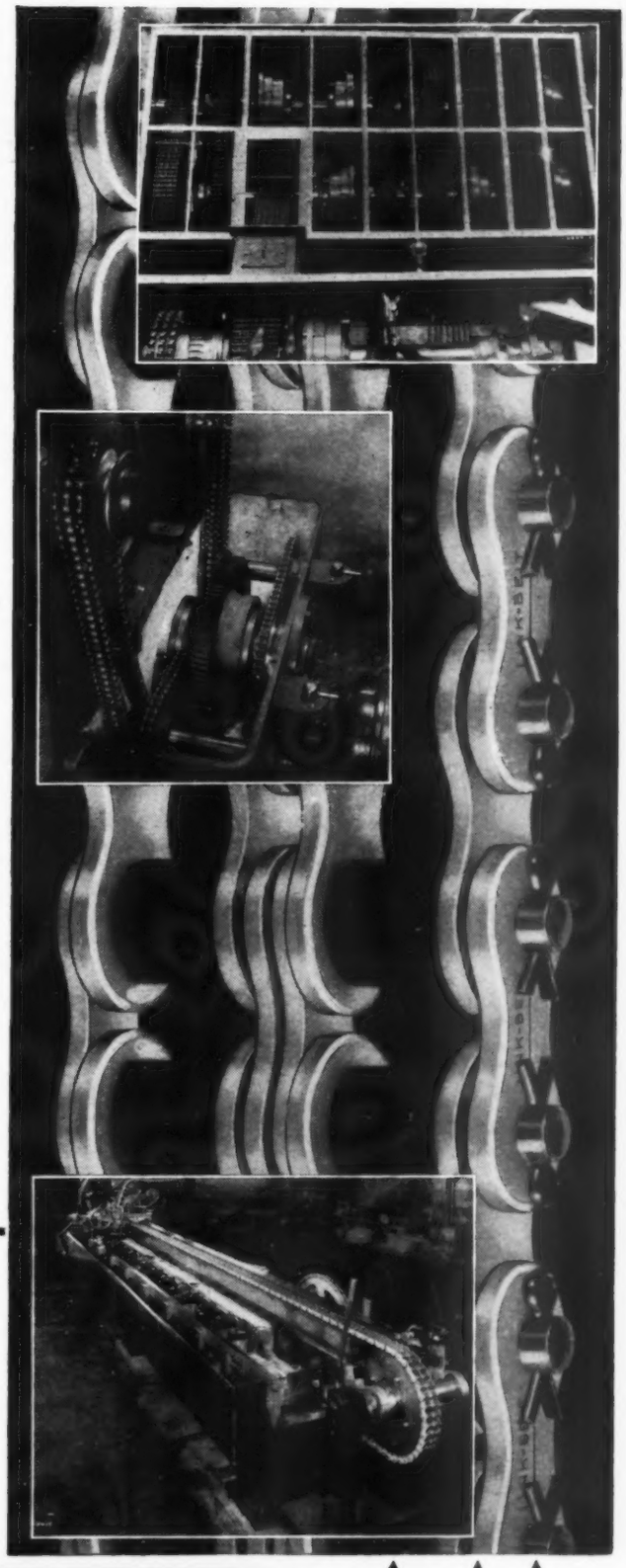
Whenever you have an operation where power brushing can help speed production, improve product, and lower costs (practically all manufacturers have them!)—it will pay you to check Osborn, the world's leading industrial brush maker.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY

Does your equipment require perfect timing and coordination? Do you have shafts turning on long or short centers? Do you want motion in either direction without slip or creep? Do you need a drive for fractional hp or 1000 hp? From ⅜" to 2½" pitch, from single to quadruple width, LINK-BELT offers you a full range of precision-made, light-weight, flexible Silverlink Roller Chain.



You should have data book No. 1957 within arm's reach!

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities. 10,432

LINK-BELT
Silverlink
ROLLER CHAINS

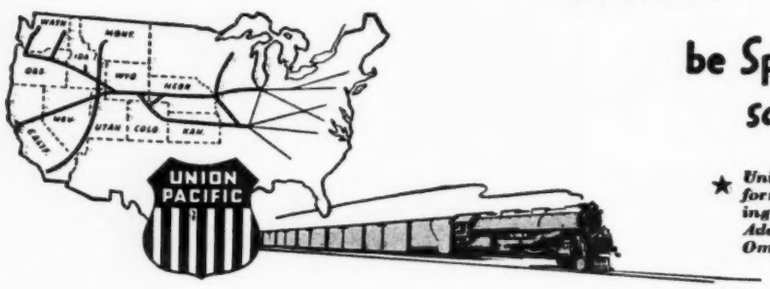
A MESSAGE TO AMERICAN INDUSTRY

More POWER to You

Three great dams, harnessing the natural force of the Colorado and Columbia Rivers, provide tremendous industrial power.

Giants of the rails, the Union Pacific "Big Boy" locomotives provide freight transportation power over the Strategic Middle Route.

Power, light, and efficient transportation . . . combined with a wealth of raw materials and adequate "growing space" . . . offer unusual opportunities for industry in the Union Pacific West.



be Specific – say "Union Pacific"

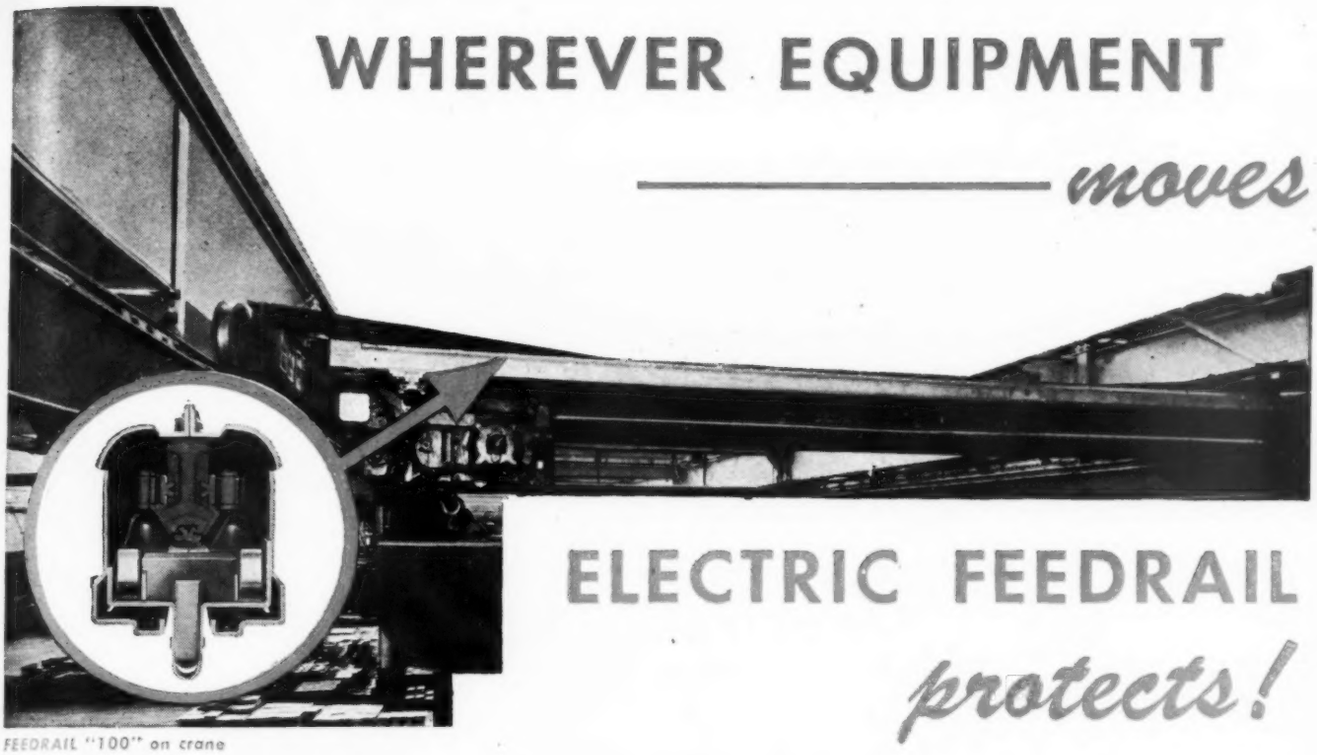
★ *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

UNION PACIFIC RAILROAD

The Strategic Middle Route

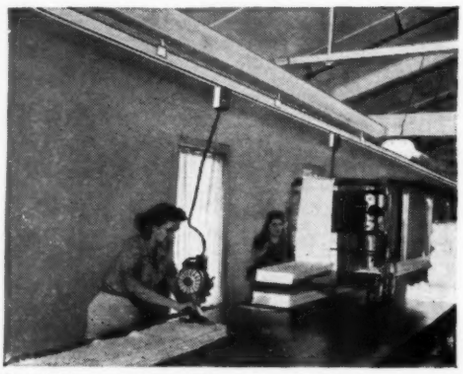
WHEREVER EQUIPMENT

moves

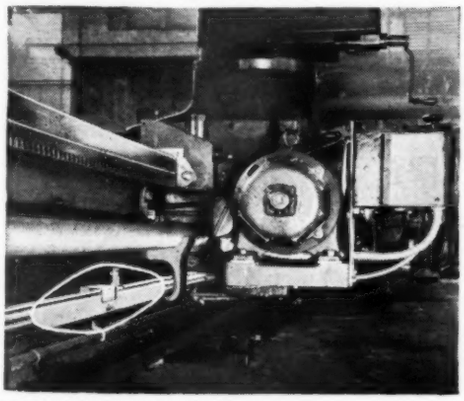


FEEDRAIL "100" on crane

ELECTRIC FEEDRAIL *protects!*



FEEDRAIL on cutting and moving cloth laying machine



FEEDRAIL on machine tool

Whenever you see exposed wires on a crane system, wires on the floor or awkward motions of portable tool operators — think of FEEDRAIL.

CRANES AND HOISTS

Electric Feedrail is an enclosed bus bar system having movable trolleys that make contact with the bus bars at all times. It is polarized, fused and grounded and each section carries the Underwriters' Label.

FEEDRAIL is protected against dust, mechanical injuries and mechanical shorts. It is furnished in assembled sections and curves. Also available for Slide Switches and transfers. Easy to install, inspect and service.

PORTABLE TOOLS

FEEDRAIL not only feeds but also supports all types of portable tools which may be readily disconnected by means of fused EVER-LOK connectors.

TEST RACKS

or any electrical equipment that has to be moved or rearranged to accommodate new production layouts is best served by FEEDRAIL.

ASK FOR FEEDRAIL CATALOGS GENERAL No. 15,
NEEDLE TRADES No. 16, MACHINE TOOL No. 17

24

ELECTRIC FEEDRAIL

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company

125 BARCLAY STREET • NEW YORK 7, N. Y.

No. 6. The Puzzle of the Counterfeit Coin

Here are 9 coins and a scale. Eight of the coins are of equal weight — the ninth is counterfeit, weighs less.

The problem: What's the least number of weighings necessary to isolate the counterfeit coin?*

Tricky, this one, but very apropos. For it's quite a trick today to solve some metal turning problems . . . to remove metal more quickly, more economically, in the least number of operations.

The chances are that turning accounts for 25 per cent or more of all machining time in your plant.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the use of Jones & Lamson machines. Our machines are designed specifically for the most efficient use of carbide tools which can remove metal 200 to 500 per cent faster. We have solved many tough cost problems. Solving them is our business.

Be skeptical of the production efficiency of all metal turning equipment in your plant.

Telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.

* The answer is 2.

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies.

Out beyond the overhead!

FIXED overhead construction and track layouts do not lend themselves to expansion problems—and if they did, expansion would be costly.

You can supplement your present equipment, speed up loading and unloading and make space now wasted just as usable as any other part of your plant or yard.

Your Northwest crawler equipment goes anywhere, loads any type of car or conveyance, handles any kind of material. It will travel up or down ramps on the loading dock and it will handle loads to overhead doors or decks.

In the storeyard it negotiates aisles and handles stacking with heavy loads. Where this is not a full-time operation, it can be routed to other work at the power plant handling coal or ashes.

One-man operation and low fuel consumption plus easy upkeep. It brings about distinct savings over steam equipment. With it firing and water troubles, and operating costs cease when you shut the engine off.

With a Northwest you can cut your heavy handling costs to a minimum without expensive overhead or tracks. Plan ahead now. Northwest brings you a combination of advantages found in no other crawler machine and there is a size for every job.

NORTHWEST ENGINEERING CO.
1811 Steger Bldg., 28 E. Jackson Blvd.
Chicago 4, Illinois

4 to 44 tons

NORTHWEST
The Crane that goes Anywhere!

Could you use Magnesium Castings at equal or less cost?

The above illustration shows a few of the Magnesium Castings made by Utica Radiator and gives an idea of the different sizes, variety and shapes that are possible.

Due to the excellent machining qualities of Magnesium, finished Magnesium castings often cost less than the more common cast metals, even though the cost of Magnesium before machining is slightly greater. We have many case histories in our files of actual savings made by changing to Magnesium castings.

During the war, Utica Radiator made elaborate Magnesium castings for the Air Corps. Our laboratories, X ray and heat treating equipment have been certified by the United States Army Air Forces and the controls which were necessary on Magnesium production during the war period are still employed.

Magnesium alloy castings of all sizes, from a fraction of an ounce up to six feet in diameter, were produced during the war. Since then, Magnesium castings have been made for a great variety of uses, including aircraft, textile machines, office equipment, scales, wire, fish line winding, baseball masks, polishing and grinding equipment, vacuum cleaners and toys.

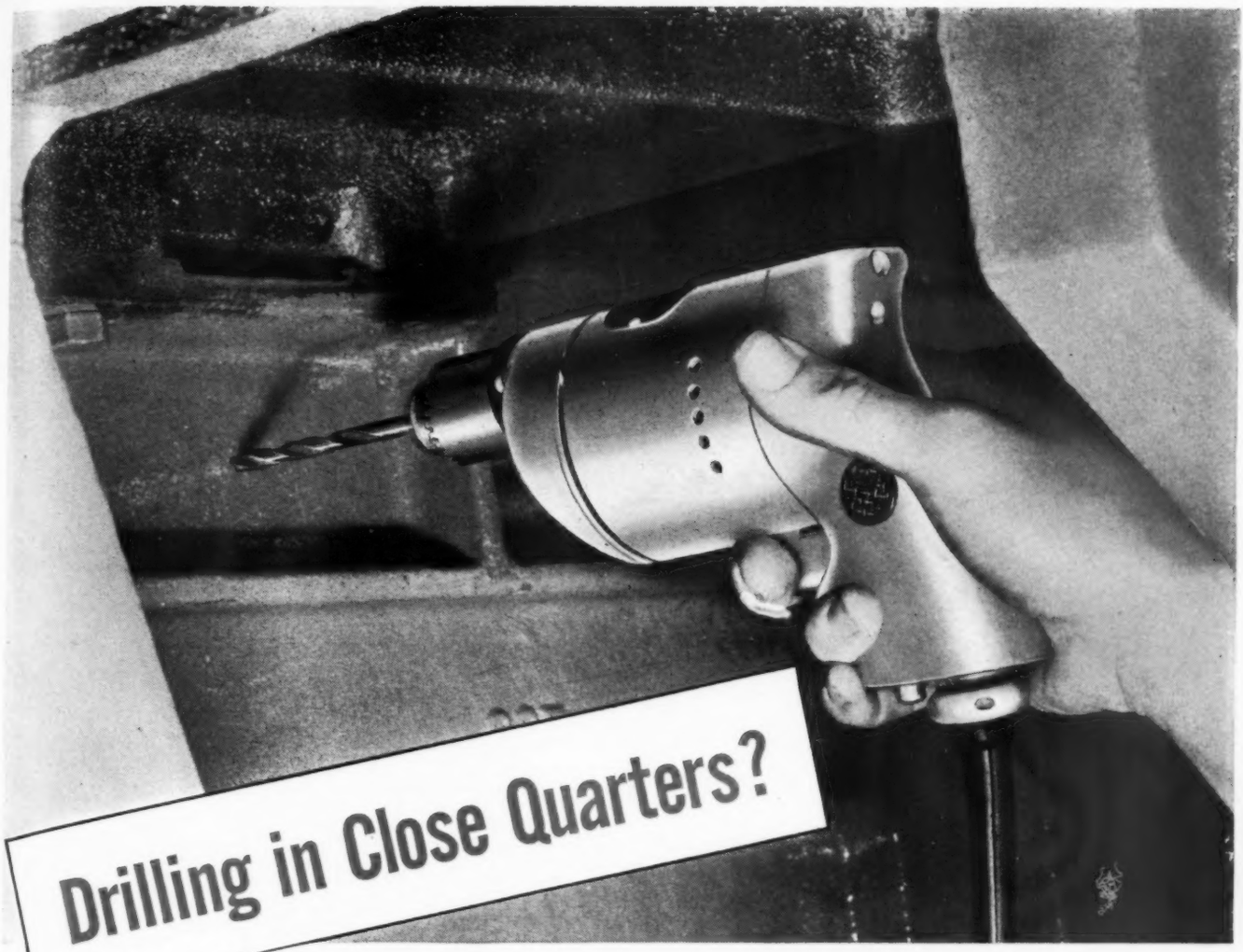
If you are having difficulties in getting deliveries of castings of other metals, why not investigate the possibilities of using Magnesium? We will be glad to study your problem—without obligation—and give you an estimate of cost.

Write for complete information to

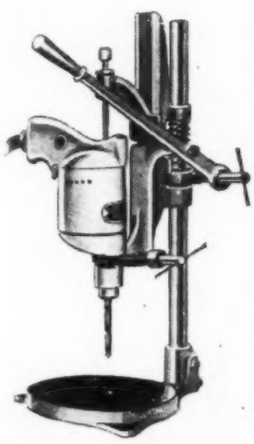
UTICA RADIATOR CORPORATION
UTICA, N. Y.

MANUFACTURERS OF

MAGNESIUM CASTINGS • ALUMINUM CASTINGS • CAST IRON PRODUCTS



That's the Spot for This Compact "HOLGUN"*



Van Dorn 1/4" Holgun In Size 20 Drill Stand

Power, compactness, ruggedness . . . the Van Dorn 1/4" HOLGUN combines all three for every kind of drilling job . . . in metal sheets, castings, forgings, wood, plastics and other materials. Short working clearance and minimum spindle offset make it ideal for working in close quarters. Its light weight reduces operator fatigue.

A Van Dorn HOLGUN drives twist drills up to 1/4", wood augers up to 1/2", Van Dorn Hole Saws for cutting clean, round holes up to 1 1/8" in diameter in any material a hacksaw will cut. Mounted in a Van Dorn Drill Stand, this versatile tool makes a powerful drill press. The handle leverage gives tremendous pressure for tough drilling jobs and feeds slowly and smoothly for most accurate work.

Your nearby Van Dorn Distributor will give you complete information on HOLGUNS and many other Portable Electric Tools for faster production, construction, maintenance and repair. Ask him about them today. For free copy of our catalog, write to: The Van Dorn Electric Tool Co., 719 Joppa Road, Towson 4, Md.

FOR POWER SPECIFY

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

PORTABLE ELECTRIC TOOLS

*Trade Mark Reg. U. S. Pat. Off.

JEFFREY REPLACEMENT PARTS

The Right Ticket for Smooth Performance

Plants that are going places insist on the fewest number of stops. Best way to assure a smooth-running production line is to replace with Jeffrey maintenance items, made to exact specifications and with the same high quality standards that govern original equipment.

Look For The Trade Mark

THE JEFFREY MANUFACTURING COMPANY

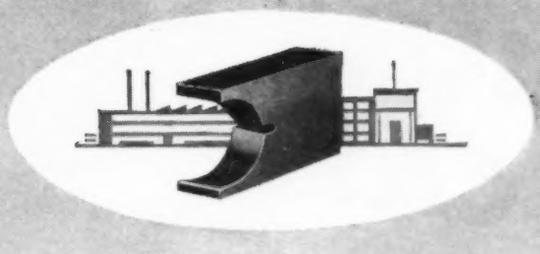
911-99 North Fourth St., Columbus 16, Ohio

ESTABLISHED 1877

Baltimore 1 Buffalo 2 Cleveland 13 Harlan Milwaukee 11 Pittsburgh 22
Birmingham 2 Chicago 3 Denver 2 Houston 5 New York 7 St. Louis 3
Boston 16 Cincinnati 2 Detroit 13 Huntington 19 Philadelphia 3 Salt Lake City 1 Scranton 3

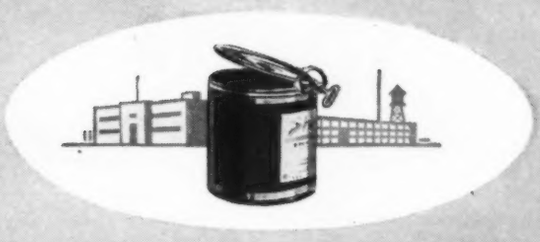
In Electric Motor Manufacture

Carboloy* work-supports make possible greater concentricity of commutators and quieter motors.



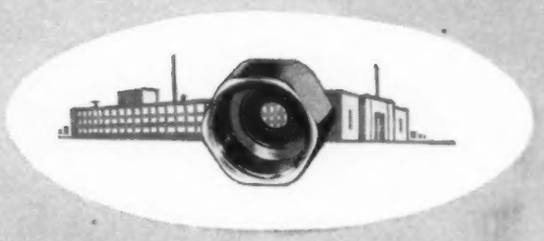
In Container Making

Carboloy* solved a problem of costly maintenance, by outlasting steel 35 to 1.



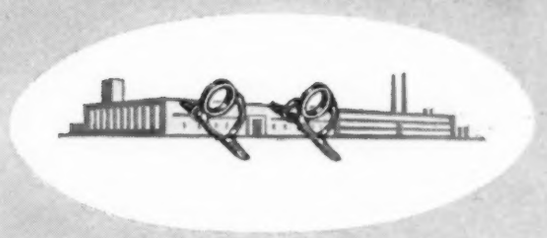
In a Farm Equipment Plant

Carboloy* showed the way to make spray discs last the life of the sprayer.



In the Sporting Goods Field

Carboloy* solved a troublesome line-guide problem (applicable to guide-wear problems in the textile field, carpet manufacture, etc.).



. . . And in hundreds of other applications, they're solving their product problems with

Carboloy,* the versatile metal

IT PAYS . . . to investigate Carboloy* Hard Metal, no matter how remote your product may seem from the realm of this versatile powdered metal. For Carboloy* Hard Metal is entering new fields every day. It is literally "working wonders" in such widely-differing fields as the manufacture of:

Spark Plugs—Flashlight Batteries—Buttons—Hoists—Pens and Pencils—Cigars

. . . to name just a few. Tough jobs are being done easier and faster. Maintenance cost is being cut down. Parts life is being boosted as high as 35 times. Production increases up to 100 times are being recorded!

Carboloy* Hard Metal may similarly solve *your* problem. Write us today, briefly describing the application, and we will promptly send our recommendations.

Put this "Versatile Metal" To Work For You—
6 Useful Properties Combined in One Metal.

High Red Hardness • Extreme Density • High Abrasion Resistance • High Modulus of Elasticity • High Compressive Strength • Low Coefficient of Expansion and Contraction.

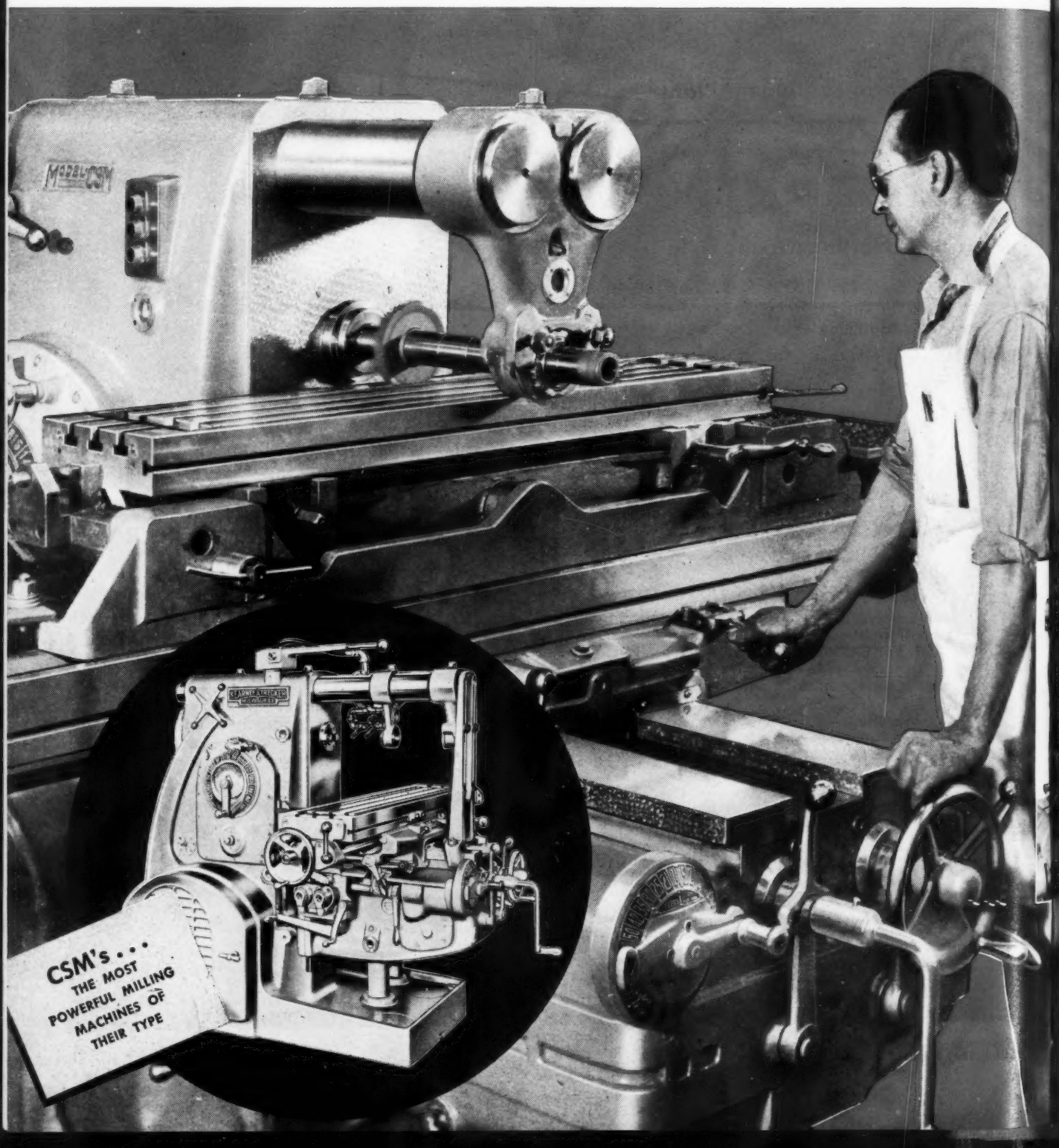
CARBOLOY* (TRADEMARK) CEMENTED CARBIDE
HARD METAL

CARBOLOY COMPANY, Inc., 11111 E. 8 Mile Road
Detroit 32, Michigan

CHICAGO • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • MILWAUKEE
NEWARK • PHILADELPHIA • PITTSBURGH • THOMASTON

MILLING CAST IRON BUT

on a Standard



FAST!

Kearney & Trecker CSM

Kearney & Trecker CSM's are expressly designed for the most efficient use of Carbide Cutters on ferrous and non-ferrous metals.

On this job, because of the size of the workpiece and fixture — we selected a 50 h.p. CSM plain model — and equipped with the proper cutter, it zipped through the cast iron workpiece easily and speedily. The details of the operation are given below:

OPERATION: Mill coolant trough
WORK PIECE: Milling machine table
MATERIAL: Close-grain, high tensile cast iron
CUTTER: 6" dia., 10 tooth, carbide tipped slotting
CUTTER SPEED: 180 RPM
TABLE FEED: 21 IPM
DEPTH OF CUT: ¾" to 1¾" (3/32"—¼" each side)
METAL REMOVAL RATE: 15 cu. in. per minute at maximum depth of cut.

NOTE the special fixture which provides maximum rigidity coupled with quick change set-ups on the workpiece and especially facilitates the loading and unloading of the workpiece on the machine.

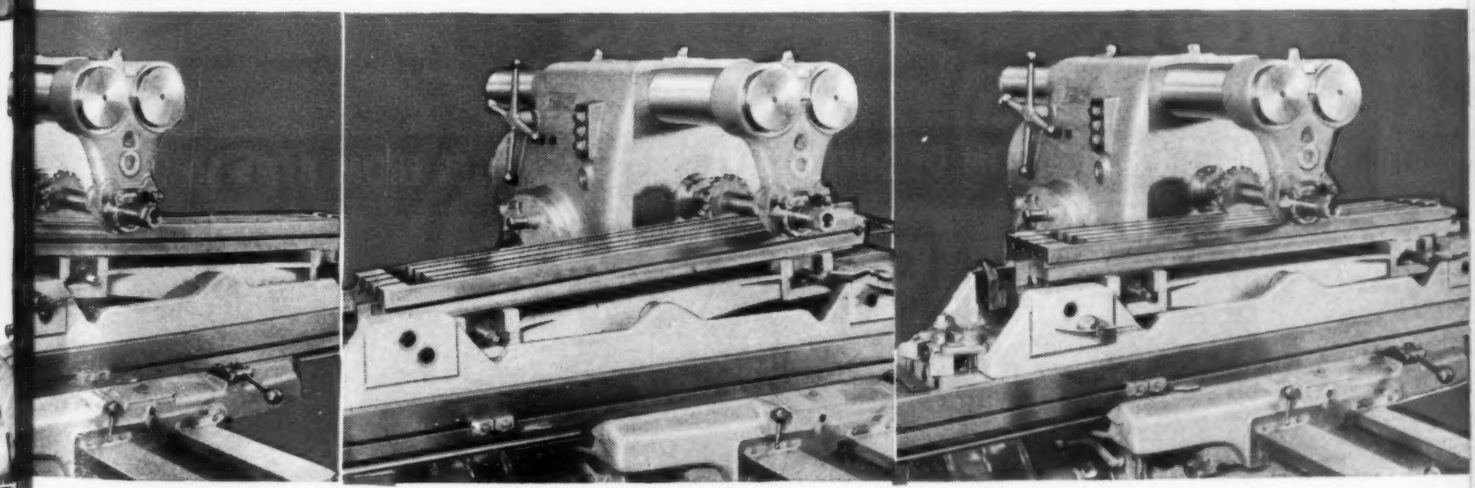
CSM Milling Machines were designed to obtain the greatest benefits from modern cutting tools, and are part of our line of standard models. The design has been developed after complete analyses of problems of milling with carbide cutters. Machines available in 20, 30 or 50 h.p. models in plain and vertical knee types.

Write for complete data on CSM machines — CATALOG CSM-20. Please indicate your business connection.

Operation 1 . . .
Workpiece tilted to right in fixture. Angular coolant channel is climb milled. Maximum depth of cut: 1¾".

Operation 2 . . .
Workpiece tilted to left in fixture. Angular coolant channel conventional milled. Maximum depth of cut: 1¾".

Operation 3 . . .
Workpiece held in horizontal position in fixture. The two angular channels now blended by climb milling.



KEARNEY & TRECKER CORPORATION

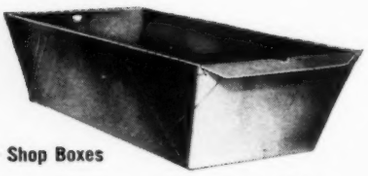
MILWAUKEE 14, WISCONSIN

BE READY FOR TOMORROW . . . WITH CSM'S

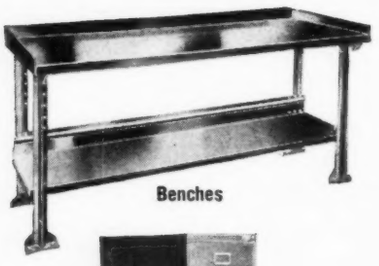
YOU FURNISH
LYON will

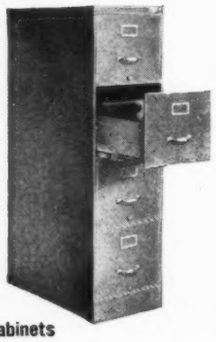
STANDARD LYON PRODUCTS

Lockers


Shop Boxes

Kitchen Cabinets


Benches

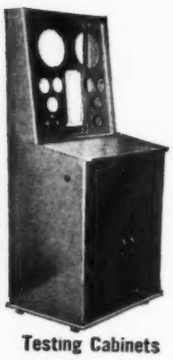

Filing Cabinets

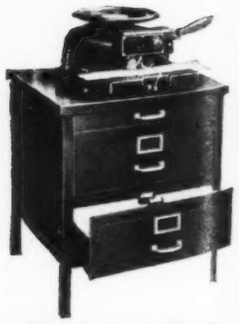
Adjustable Shelving

CONTRACT PRODUCTION OF SHEET STEEL ITEMS—GAUGES FROM 8 TO 30

Water Cooler Containers

Storage Battery Racks


Testing Cabinets


Office Equipment Stands

THE STEEL make the product

Lyon facilities for the production of a wide range of sheet steel products are far in excess of sheet steel receipts. Steel producers have been doing the best job in the face of current difficulties but there just isn't enough steel to go around. But, if you have steel on hand, or available, Lyon can give you help in one of two ways:

1 STANDARD LYONS PRODUCTS

To complete your plant expansion or conversion program, we will accept your sheet steel (12 to 24 gauge and certain sizes of band steel) and supply you pound for pound with any selection of "Lyon Standard Products" currently in production, a few of which are: Steel Shelving, Lockers, Shop Equipment, Kitchen Cabinets, Filing Cabinets, and Gravity Conveyors.

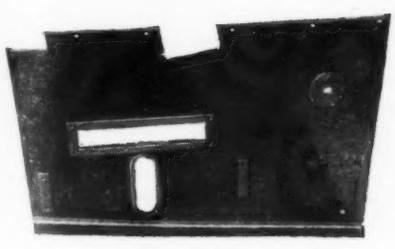
2 SPECIALIZED CONTRACT PRODUCTION

We will manufacture to your specifications: assemblies, sub-assemblies or parts, in gauges No. 8 and lighter up to No. 30; in Lyon production run quantities.

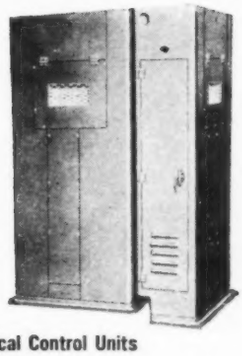
Get in touch with your Lyon Dealer . . . or your closest District Office

LYON METAL PRODUCTS, INCORPORATED

Branches and Dealers in All Principal Cities



Special Parts



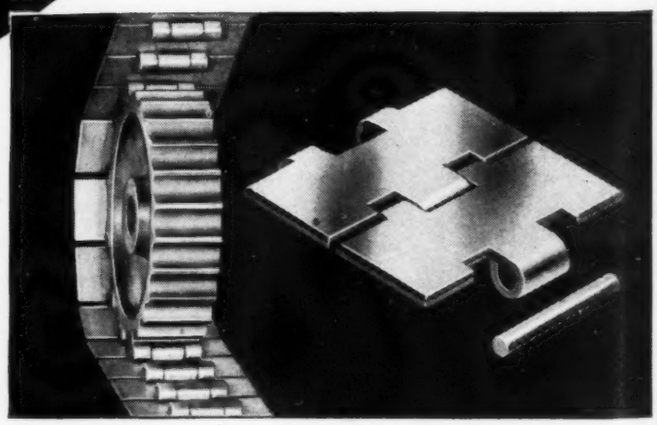
Electrical Control Units

Home Appliance Stands

Millions of Jars
BUT NEVER A JOLT!

① **THAT'S THE RECORD** of Rex Table Top chain belts in hundreds of can, bottle, and package conveying applications. Table Top smooths out the "jolts" that cause wasteful spillage and breakage.

② **IN THIS PLANT** jars of apple butter travel smoothly along on the continuously moving flat surface of Rex Table Top chain. And, because there is a much smaller gap between links when flexing over sprockets, it does not catch or trip the jars at transfer points. The coined, accurately beveled edges of Table Top allow it to slide freely under blocked containers.



③ **TABLE TOP** is simplicity itself... precision formed one-piece platform links connected by husky rivets. There are no pockets to catch and hold foreign material. Table Top fits the same tracks as ordinary flat top chain . . . simplifying changeovers on your present equipment. Furnished in stainless or case hardened steel. For complete information, send for your copy of Bulletin No. 464.

REX CHAIN BELTS *manufactured in every available type for the positive transmission of power, timing of operations and conveying of materials*

CHAIN BELT COMPANY OF MILWAUKEE • 1667 W. Bruce Street, Milwaukee 4, Wis.

ANHATTAN *OIL-PROOF* CONVEYOR BELT

MADE WITH FLEXLASTICS

. . . unàffected by oil-treated coal or coke

Paranite Oil-Proof Conveyor Belt carrying oil-treated coal in an illuminating gas plant

The first all-synthetic belt made for conveying coke was installed in 1936. It was made by Manhattan . . . and today after ten years, this original Manhattan Paranite Conveyor Belt is still on the job. This is due to Manhattan engineering in Strength Members and FLEXLASTICS to produce a conveyor belt to take abrasion and oil, while retaining its long life and elasticity.

Other installations of Paranite-G.O.P. (Gas-Oil-Proof) Conveyor Belts have been in successful operation for record periods in power stations, gas works, brick and tile, coke, asphalt, chemical and similar plants where oily substances are encountered.

Photograph below shows the first Paranite-G.O.P. Conveyor Belt 10 years old and still carrying coke to the top of a truck-loading hopper where oil is sprayed on the coke. A Paranite Oil-Proof Conveyor Belt will do equally well for you. Make your next a Manhattan Conveyor.

FLEXLASTICS is an exclusive MANHATTAN trade mark. Only MANHATTAN can make FLEXLASTICS.

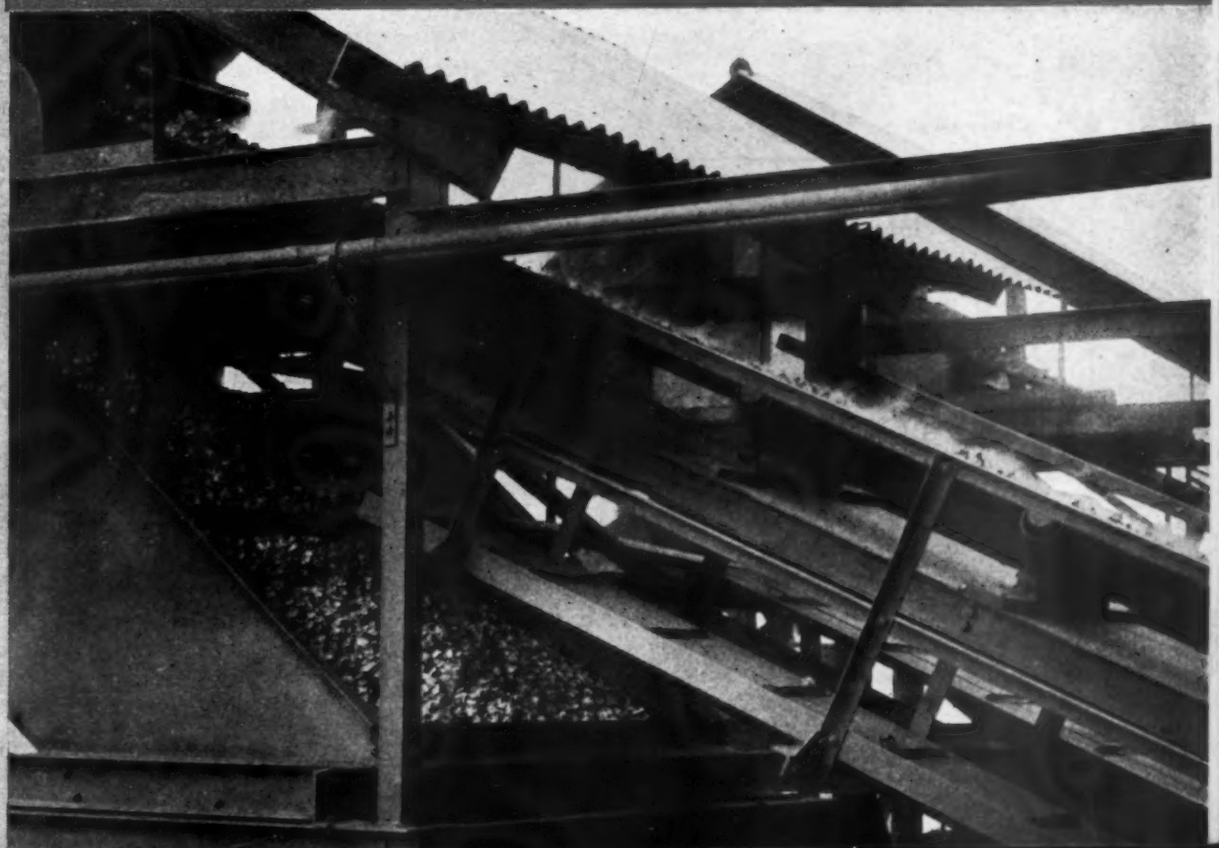
RAYBESTOS-MANHATTAN, INC.

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES AND FACTORIES PASSAIC, NEW JERSEY

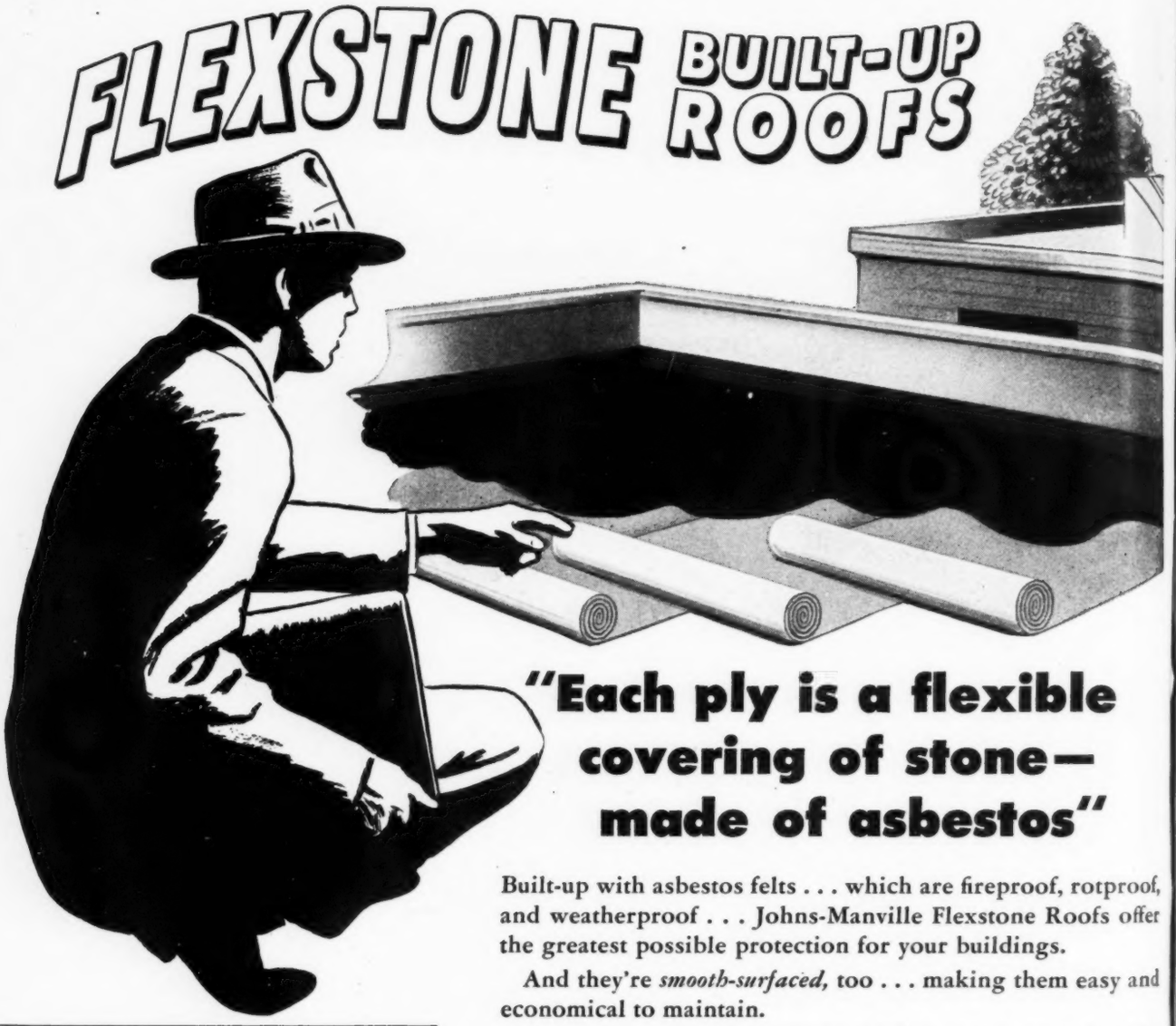
ADVANTAGES

- Not affected by oil
- Will not soften
- Cover will not swell, buckle or peel
- Less coal spillage
- Runs straighter on idlers
- Less ply separation
- Flexes better over small pulleys
- Resists abrasion
- Resists destructive effects of heat better
- Non-spark
- Mildew-proofed fabric
- Increases production
- Has longer life
- Reduces cost



Tops for Tomorrow's Buildings

FLEXSTONE BUILT-UP ROOFS



"Each ply is a flexible covering of stone—made of asbestos"

Built-up with asbestos felts . . . which are fireproof, rotproof, and weatherproof . . . Johns-Manville Flexstone Roofs offer the greatest possible protection for your buildings.

And they're *smooth-surfaced,* too . . . making them easy and economical to maintain.

All Johns-Manville Flexstone Roofs are engineered to the particular requirements of your building—whether it's new construction or a re-roofing project. To insure skilled application, they are applied by Johns-Manville Approved Roofers.

Three grades are available: *Flexstone Super "A", Flexstone Standard,* and *Flexstone Service*—each the finest that can be specified for its purpose. Write for our brochure BU-51A. Johns-Manville, Dept. **FM-12,** Box 290, New York 16, N. Y.

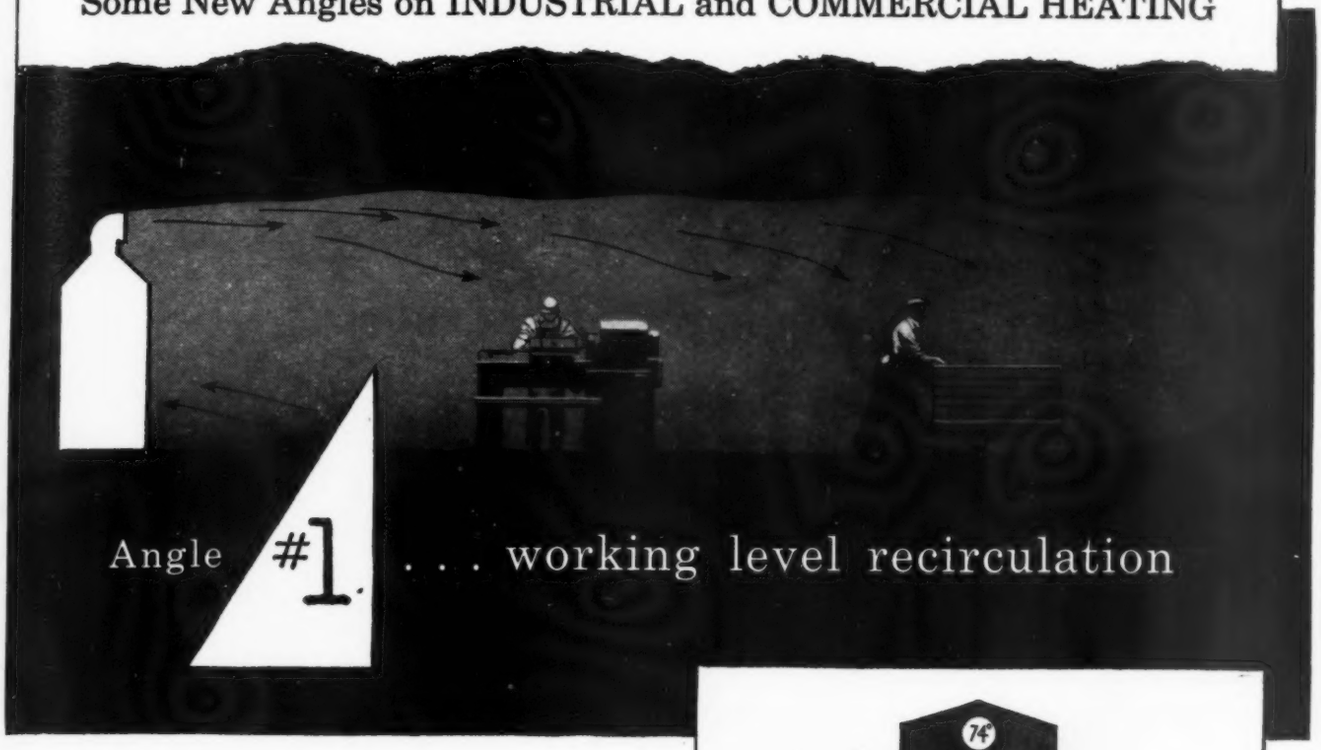
Advantages of J-M Flexstone Built-Up Roofs . . .

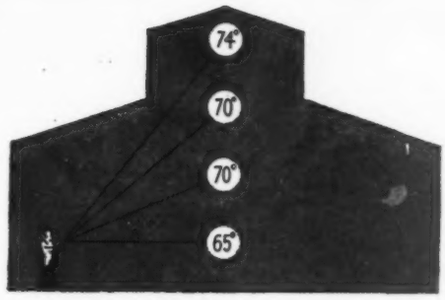
Asbestos felts . . . smooth-surfaced, fireproof and rotproof
Won't dry out from the sun
Need no periodic coating
Upkeep expense minimized
No extra weight from slag.
No clogging of drains or gutters
Actual roof can be seen
Easy to find and repair damage
Built for long years of service

Because of the unprecedented demand for J-M Building Materials, there may be times when we cannot make immediate delivery. We urge you to anticipate your requirements as far in advance as possible.

Johns-Manville FLEXSTONE Roofs

Some New Angles on INDUSTRIAL and COMMERCIAL HEATING





Actual tests with balloon-suspended thermometers in a building with 200,000 square feet of roof showed temperature differential between roof and working area to be only 9 degrees with Dravo Heaters. This is a big fuel-saving advantage when compared with other methods in which roof area temperatures are often 35 degrees higher than those at the working level.

The Dravo Heater offers today's highest possible efficiency for open space heating. It recirculates warm air in the working level, thus minimizing the tendency of the heated air to rise and cause excessive heat losses through the roof. Under the Dravo method warm air is discharged above the heads of the workers and cool air is taken off the floor. This provides a thermostatically controlled comfort zone in the working level with no annoyance to workers.

In addition to saving fuel through low roof heat loss, the Dravo Heater is extremely economical in these respects . . . **Sustained efficiency of 80 to 85% by constantly getting more Btus from each gallon of oil or cubic foot of gas burned. —Lower initial cost compared with indirect heating systems. —Ease of installation . . . it is necessary only to provide power line, fuel line and stack. —No stand-by heat or specialized attendant is necessary. Heater operates only when thermostat dictates your requirements.**

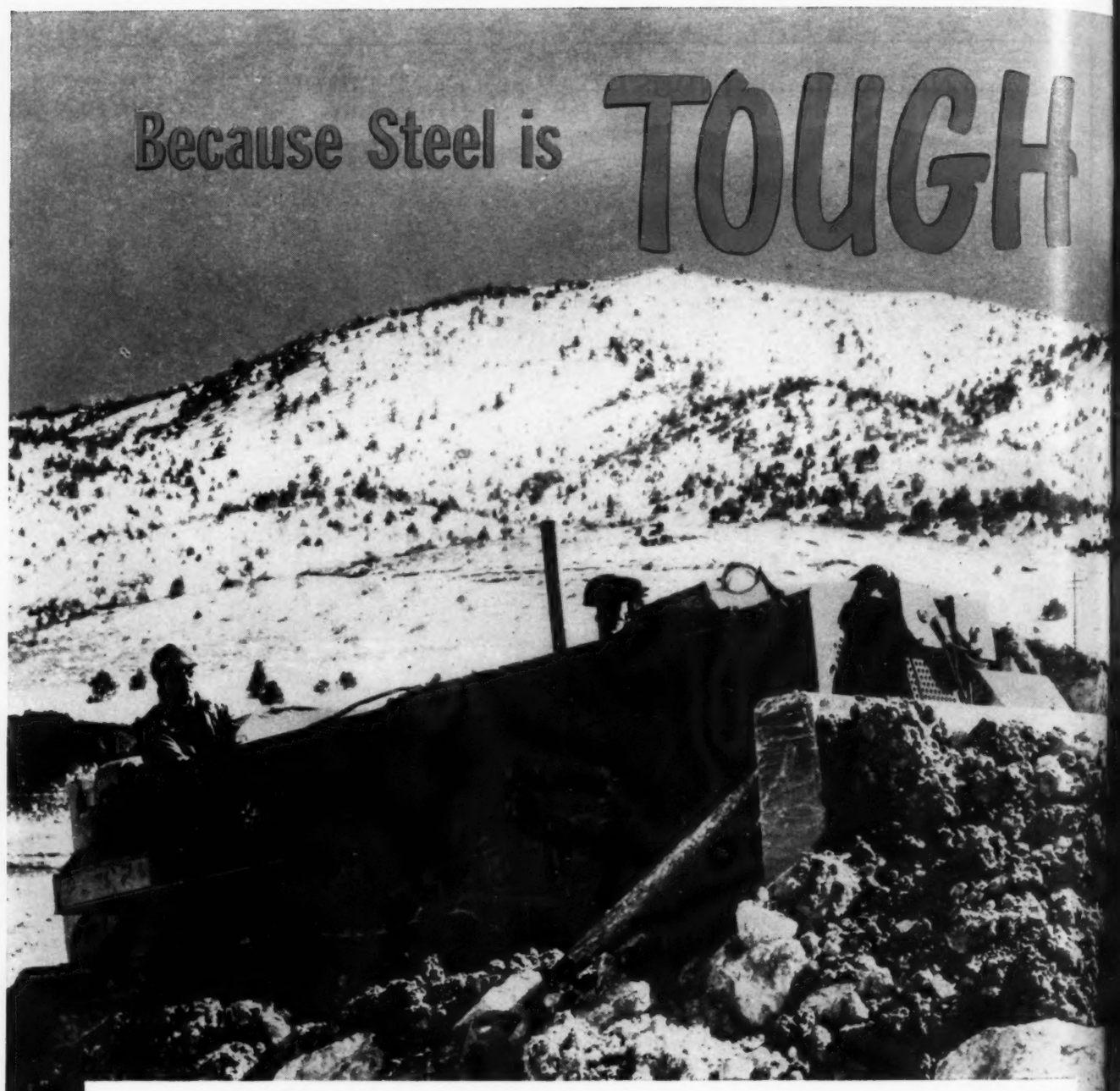
Dravo Heaters are available in capacities ranging from 400,000 to 2,000,000 BTUs per hour output. The money-saving angles for Industrial and Commercial Heating with DRAVO COUNTERFLO DIRECT FIRED HEATERS are more fully described in Bulletin NH 516. Write Heating Section, DRAVO CORPORATION, 300 Penn Avenue, Pittsburgh 22, Pa.

Dravo Counterflo Direct Fired Heaters are products of the Machinery Division.

DRAVO CORPORATION

PITTSBURGH • WILMINGTON • PHILADELPHIA • WASHINGTON

NEW YORK • CLEVELAND • DETROIT



Special Purpose Steels

—to meet the many widely different requirements of product designers. There is a steel for almost every imaginable use, whether you are looking for toughness or strength, corrosion-resistance or paintability,—or any of the countless other qualities available in these Special Purpose steels:

U·S·S STAINLESS AND HEAT-RESISTING STEELS to assure high resistance to corrosion and heat, and to reduce weight.

U·S·S CARILLOY STEELS—Alloy steels for the special jobs of industry.

U·S·S HIGH STRENGTH STEELS to resist atmospheric corrosion and increase strength without adding weight.

U·S·S COPPER STEEL to give at least twice the atmospheric corrosion resistance of regular steel at little additional cost.

U·S·S ABRASION-RESISTING STEEL to combat wear and friction.

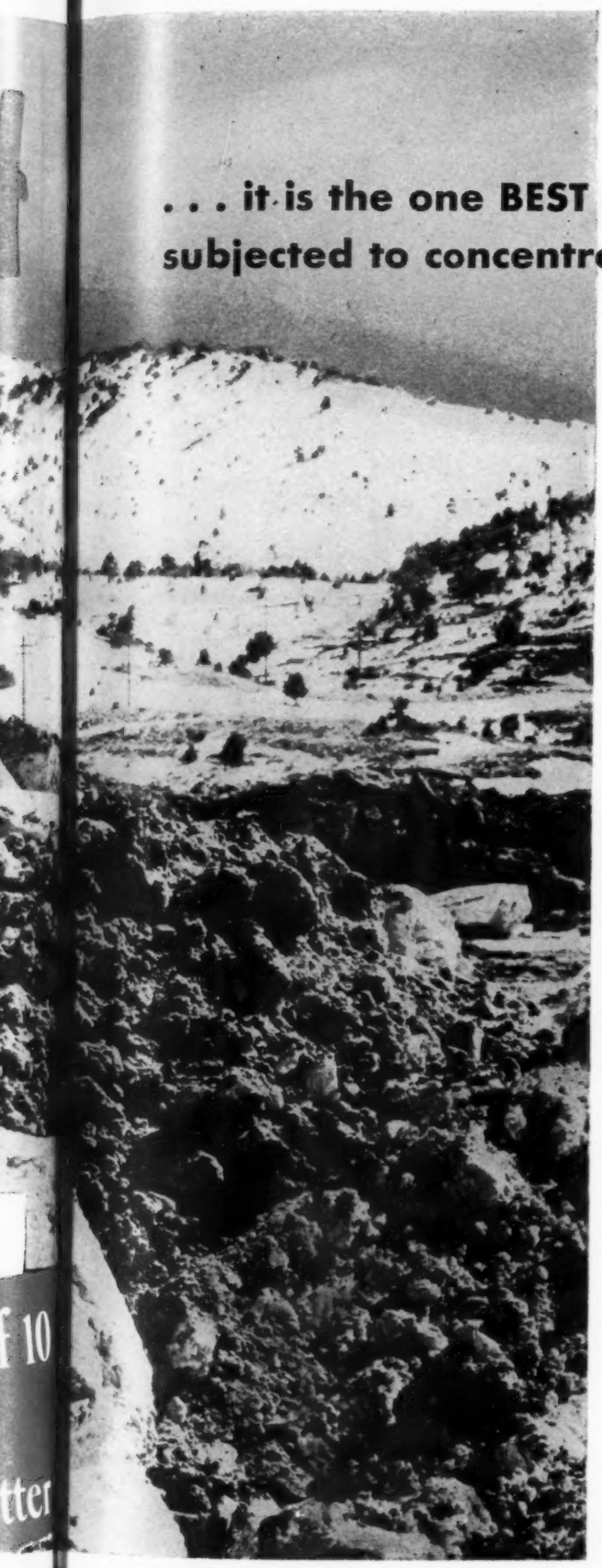
U·S·S HOT-ROLLED AND COLD-ROLLED STEELS to provide the basic advantages of steel, plus maximum economy in accordance with the needs of each job.

U·S·S PAINTBOND — A galvanized, Bonderized sheet that permits immediate painting and holds paint tighter.

U·S·S VITRENAMEL—Sheets designed especially for porcelain enameling.

U·S·S ELECTRICAL SHEETS for motors, generators and transformers.

9 times out of 10 STEEL will do it better



. . . it is the one BEST metal to use where parts are subjected to concentrated stress, wear, and shock

BECAUSE steel is tough . . . *tougher than any other metal* . . . it is the basic raw material for countless products that must be built to take abuse.

Yet steel, to be tough enough for the *specific use*, has to be designed that way. And therein lies its remarkable versatility.

Steel can be designed to combine toughness with a wide variety of other metallurgical characteristics that will best adapt it to the many different jobs it has to do. It can be made tough and elastic . . . tough and ductile . . . tough and hard. It can be made almost anything it has to be.

That's why, when you are ready to select steel for your product, it will pay you to check with our metallurgical experts. Tell us what you want the steel to do and we'll tell you which steel of the thousands available has just the right combination of features to do the best job at the lowest cost to you and your customers.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

COLUMBIA STEEL COMPANY

San Francisco, Pacific Coast Distributors

TENNESSEE COAL, IRON & RAILROAD COMPANY,

Birmingham, Southern Distributors

United States Steel Supply Company, Chicago, *Warehouse Distributors*

United States Steel Export Company, New York

USS STEEL — UNITED STATES STEEL

UNITED STATES STEEL

A NEW FILTER... A NEW PRINCIPLE

to cut cartridge replacement costs in half

Cuno MICRO-KLEAN filters are available in a wide range of housing designs and replacement cartridges can be supplied in practically any desired length. Loosening a single nut disassembles housing for easy cartridge replacement on model illustrated.

Cuno's MICRO-KLEAN . . . a micronic-type filter made of molded fibre . . . uses Graded Density in Depth to collect more solids before needing replacement.

Here's a micronic filter that eats more dirt without choking.

Experience shows that the Cuno MICRO-KLEAN cartridge maintains efficiency twice as long as other micronic-type cartridges.

That's because the fibre concentration, travelling radially inward from the pressure-side surface to the discharge-side surface, is progressively greater — the spaces between fibres become smaller and more numerous.

MAXIMUM EFFICIENCY— NO CHANNELING

The MICRO-KLEAN filter cartridge is resinous-impregnated molded fibre. Fibres of micronic diameter and graded length are oriented for uniform distribution and formed into a cylindrical cartridge,under conditions permitting a controlled variation of density radially to a pre-determined optimum standard. Thus, as the fluid flows through progressively smaller and more numerous interstices, the foreign particles penetrate to varying depths according to their size. This means that the cartridge can accommodate more solids without affecting flow — and will have a longer efficiency life before needing replacement.

This method of controlling structure gives the same range of density over the entire element. The natural arrangement of the fibre mixture is not disturbed laterally, so the fibres remain criss-crossed in all directions and porosity is uniform concentrically at any depth. This — and the fact that the fibre structure is preserved by resinous impregnation and polymerization — means maximum efficiency for every unit of filter area — and a *sure* protection against channeling.

Cartridges now available will remove all particles larger than 25 microns and the greatest proportion of particles down to 1 micron. (Coarser and finer filtration will be available soon). Use coupon to write for information in more detail.

WHAT MAKES MICRO-KLEAN LAST LONGER?

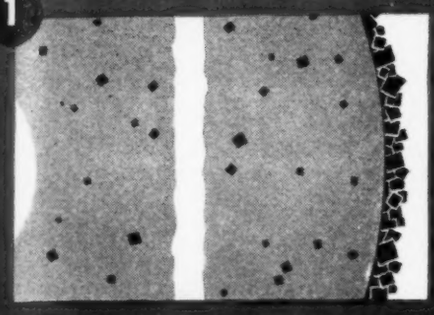
A special method of "felting" and impregnating micronic fibres, developed by Cuno engineers using the resources of a nationally known research foundation, has produced a depth-type micronic cartridge with *exclusive* advantages:

1. Graded Density in Depth, controlled concentrically and radially. Spaces between fibres become progressively smaller and more numerous approaching discharge surface. Smaller particles penetrate to varying depths — no sealing-over of inlet surface.

2. Resinous impregnated — each micronic fibre bonded in position — absolute protection against channeling, rupturing, shrinking or distortion.

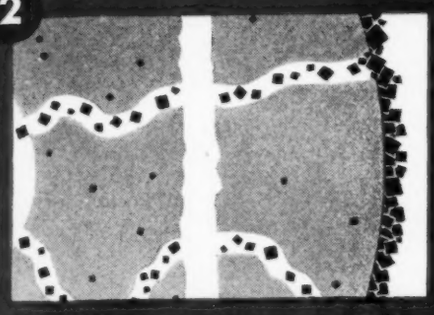
How **MICRO-KLEAN** *Compares with Other Depth-Type Filters*

1



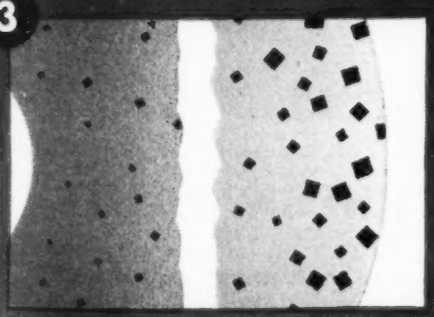
SURFACE LOADING: Minimum openings are same on pressure side and discharge side; therefore, dirt accumulation is largely on pressure side.

2



CHANNELING: Uncontrolled distribution of filter media in the element permits fluid to find channels, passing solids larger than specified.

3



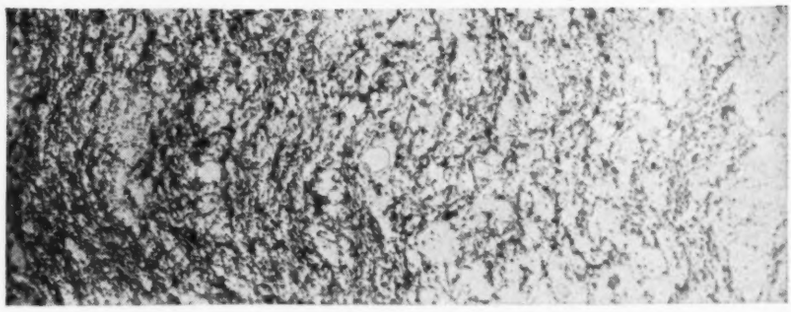
MICRO-KLEAN: Filter medium increases in density in direction of flow, from openings larger than rating to minimum openings on discharge-surface — more solids of all sizes collected within the element before stopping flow. Control of fibre distribution and bonding of fibres in correct position provide permanent channel-free structure.

CUNO

Fluid Conditioning

REMOVES MORE SIZES OF SOLIDS
FROM MORE TYPES OF FLUIDS

GRADED DENSITY IN DEPTH



Photomicrograph shows progressively greater fibre density encountered by fluid as it passes from pressure surface (right) through depth of element to discharge surface (left).

MICRO-KLEAN *greatly extends the range of applications for Cuno Fluid-Conditioning*

With MICRO-KLEAN, Cuno — whose filters are used more by Industry than any other brand — offers you the equipment and engineering service to help you handle successfully almost any fluid-cleaning requirement.

Cuno's famous all-metal continuously-cleanable AUTO-KLEAN removes all particles down to .0035" from practically any fluids other than those containing highly abrasive solids. Cuno's wire-wound self-cleaning FLO-KLEAN is recommended for fluids containing large proportions of highly abrasive solids — mill river water, etc. Cuno's specially-designed COOLANT-KLEAN is for coolants used in precision grinding. Cuno's air filters remove unwanted solids, entrained moisture and oil from compressed air.

And now Cuno's MICRO-KLEAN extends the range of Cuno Fluid Conditioning down to micronic particles!

Cuno maintains a competent staff of engineers in twenty key cities across the country, who will cooperate with you personally and bring to you the active participation of Cuno's factory engineering staff. Sample fluid tests are conducted, either in our laboratory or in the field, upon arrangement.

Meanwhile, have us send you more information on Cuno MICRO-KLEAN. For convenience, use the coupon, listing the types of service in which you are interested.

MICRO-KLEAN HOUSING DESIGNS

Complete range from ⅜" to 4" inlet and outlet connections, handling up to 300 gpm. Other sizes available soon.

MICRO-KLEAN CARTRIDGE SIZES

1" I. D. and 2¾" O. D. standard at present. Standard lengths: 4", 8", 10". Special lengths available for built-in installations or for housings already in service.

CUNO ENGINEERING CORPORATION
6117 South Vine Street, Meriden, Conn.

Please send me information on Micro-Klean Filter relative to the services checked.

- ☐ Lubricating Oil
- ☐ Hydraulic Oil
- ☐ Fuel Oil, Diesel
- ☐ Water and Water Solutions
- ☐ Compressed Air
- ☐ Acids
- ☐ Fuel Oil, burner (Domestic and industrial)

Send information on MICRO-KLEAN to handle the following: (Write any other fluid-cleaning problem here.)

.....

NAME .....

COMPANY .....

ADDRESS .....

Roller Bearing Housing

made with RIGID INSPECTION!

... *another* UNITCASTING where accuracy is a MUST!

This commonplace part—the ROLLER BEARING HOUSING used on passenger cars—is produced with extra care at Unitcast to meet very strict inspection. The result—meets high standards of performance in gruelling service.

In jobs like this where units must be *accurate and tough*—use UNITCASTINGS! They're precision-poured and molded in America's most modern electric steel foundry—where accuracy is automatically controlled. Fewer rejects ... less machining ... lower costs.

Write concerning your requirements. Unitcast Corporation, Toledo, Ohio.

CHECK CHART

Send us this information with blueprints to get Unitcastings "geared to the job".

1. The end use of the casting.
2. Will it be welded to component part or frame?
3. Physical properties.
4. Subsequent heat treating.
5. Mechanical tolerances.
6. Processing of casting in your shop before assembly.
7. Estimated quantity at one time and total quantity.

UNITCAST CORPORATION

ALLOY AND CARBON ELECTRIC STEEL CASTINGS

NEW! QUIET!

HIGH PRESSURE - HIGH VOLUME

HYDRAULIC PUMPS

with a proved 95% volumetric efficiency rating!...

For the first time, you can now have economical hydraulic pumps that combine *quiet operation* with *high pressure, high volume delivery.*

In the currently announced DENISON HydrOILic Pumps a total of eight revolutionary features have been incorporated. Among other features of these compact, axial piston, constant displacement pumps, is their unique ability to operate *continuously at 3500 psi,* maintaining volumetric efficiencies of 95% or better.

These DENISON HydrOILic Pumps are available in 3 models, delivering volumes ranging from 6 to 32 gpm. Write NOW for your copy of a new completely informative bulletin just off the press.

HydrOILics — INDUSTRY'S RIGHT HAND

DENISON EQUIPMENT in APPLIED HydrOILics

THE DENISON ENGINEERING CO.
1154 Dublin Road, Columbus 16, Ohio

SERVING YOU THROUGH SCIENCE

HERE'S HELP FOR THE INDUSTRIAL TIRE BUYER!

U.S. load-rated INDUSTRIAL TIRES

Having trouble finding the right tire for the job? You'll find it in the *complete* line of U. S. Industrial Tires.

Looking for better *quality?* "U. S." can fill your needs because these tires are built to excel on *every* job.

Bothered by *servicing* problems? Your U. S. Tire Distributor offers skilled, prompt, *on-the-spot* service! Get in touch with him —*today!* He's listed in your phone book!

YOUR U. S. INDUSTRIAL TIRE DISTRIBUTOR HAS the right tire . . . the right service . . . for every job!

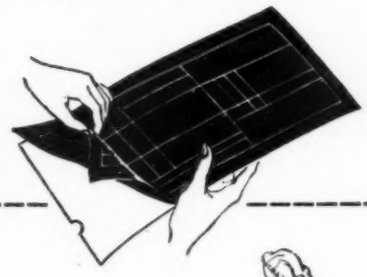
UNITED STATES RUBBER COMPANY

1230 AVENUE OF THE AMERICAS · ROCKEFELLER CENTER · NEW YORK 20, N. Y.

The 1-2-3 of paper work production

Speed it . . . control it . . . save money on it—

with Mimeograph brand die-impressed stencils . . . A single writing gives you as many copies as you need on the kinds of forms you want to use—that's the big advantage Mimeograph brand die-impressed stencils give to paper work procedures.



1 Your own ruled forms or headings are die-impressed into Mimeograph brand stencil sheets.

2 All your typists do is add the variable, fill-in material by typewriter.

3 Then the completed form and variable information are produced together in one operation on the Mimeograph brand duplicator.

FREE ***Send for more information on Mimeograph brand die-impressed stencils—how they speed production, save money, and simplify control of paper work systems and procedures.***

It's as simple and easy as that. You don't have to wait for preprinted forms—or stock and store obsolescent forms. One proofreading is enough—for all copies are identical. And all copies are easy to read, clear, black-and-white, non-smudging, non-fading.

For complete details and the assistance of experts in factory paper work problems, write A. B. Dick Company, 720 West Jackson Boulevard, Chicago 6, Illinois.

A. B. Dick Company, Dept. L-1246
720 West Jackson Boulevard, Chicago 6, Illinois

Please send me a free copy of the new folder, *Mimeograph Die-Impressed Stencils.*

NAME.....

ORGANIZATION.....

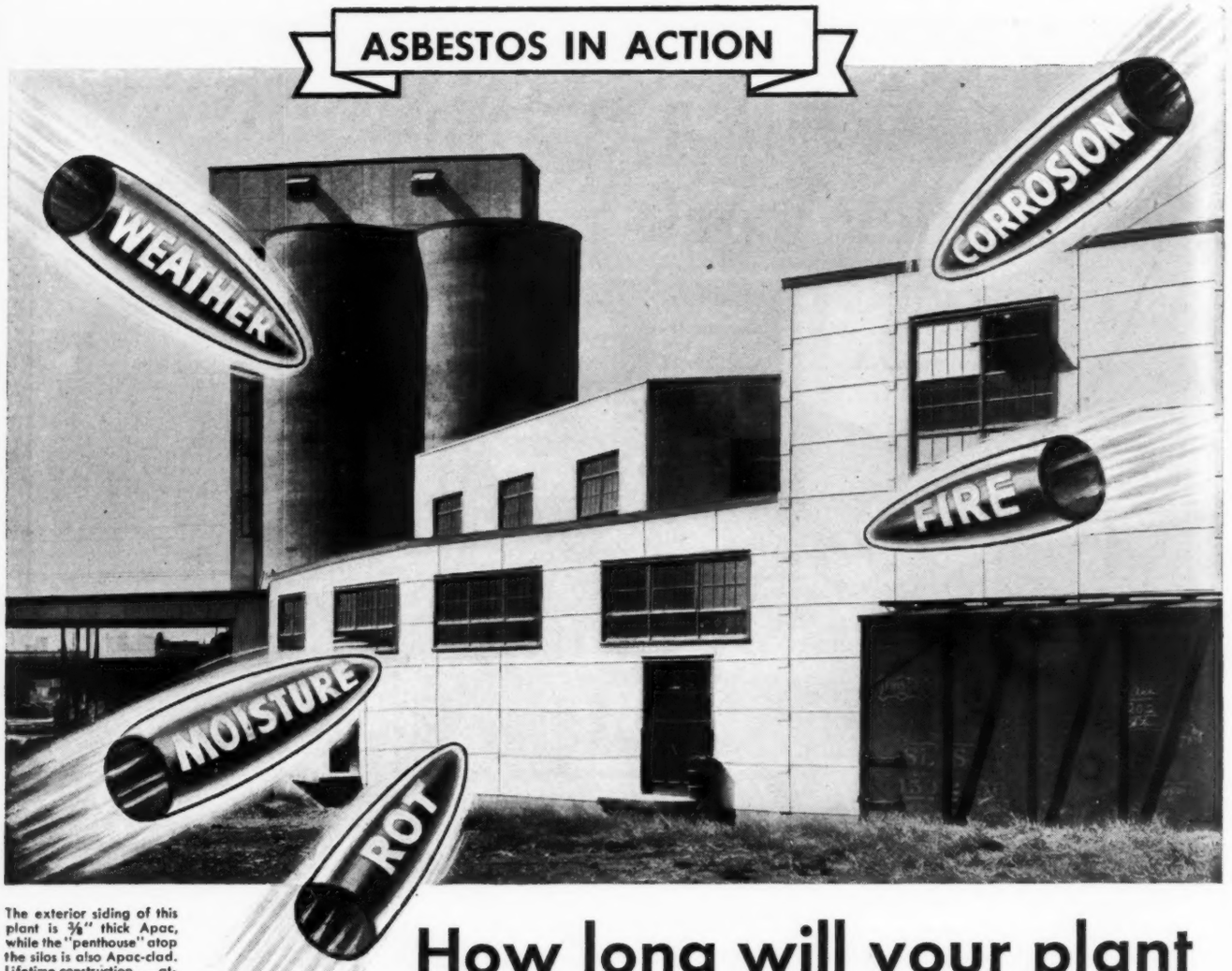
STREET.....

CITY.....STATE.....

Mimeograph brand duplicator

MIMEOGRAPH is the trade-mark of A. B. Dick Company, Chicago, registered in the U. S. Patent Office.

COPYRIGHT 1946, A. B. DICK COMPANY



The exterior siding of this plant is 3/16" thick Apac, while the "penthouse" atop the silos is also Apac-clad. Lifetime construction . . . attractive, too!

How long will your plant withstand attacks like these?

You can have *lifetime* protection against *all* these destructive forces . . . if you build or remodel with K&M "Century" Apac structural sheets. Made of tough asbestos and Portland cement, this fire-resistant, durable 4′ x 8′ board is practically indestructible . . . actually grows tougher with age.

Versatile and fine-looking, Apac is economical, too—its low first cost is last cost, as it never needs painting or other expensive upkeep. Better look into this ideal building material . . . just write to us for complete Apac facts.

A FEW OF APAC'S MANY OTHER USES IN INDUSTRY

- OFFICE PANELLING
- INSIDE SHEATHING
- PARTITIONS
- SHOWER STALLS
- ELEVATOR CASINGS
- STOCK ROOMS
- STORAGE BINS

Nature made Asbestos . . .
Keasbey & Mattison has been making it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

EASY CUTTING!

NEW

6", 7" and 8" SIZES

Now in Production
AT OUR AURORA PLANT

Thor

PORTABLE ELECTRIC SAWS
DO BETTER WORK . . . EASIER and FASTER

You get plenty of speed and power—*plus smooth operation*—in Thor's new Portable Universal Electric Saws. For industrial maintenance work or hundreds of other types of carpentry—they are real time and labor savers. All-ball-bearing design assures long, satisfactory service. Automatic telescopic guard gives full protection to operator. Natural, firm hand hold provides complete control.

Demonstrate this handy, efficient tool to your own satisfaction—ask for one now.

INDEPENDENT PNEUMATIC TOOL CO.
600 W. Jackson Blvd., Chicago 6, Ill.

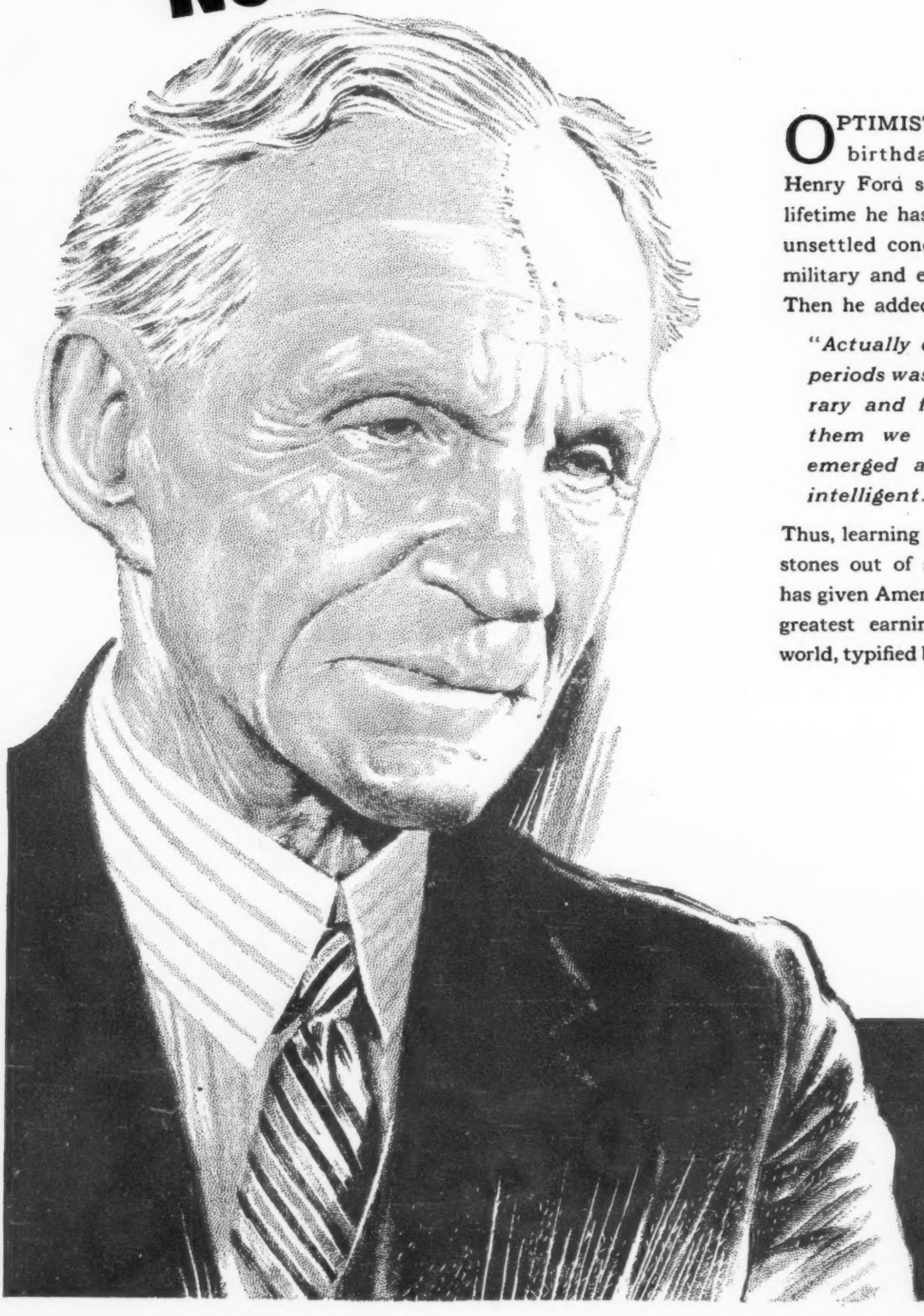
Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York
Philadelphia Pittsburgh St. Louis Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

then he said to himself:

"Never too old to earn"



OPTIMISTIC on his 83rd birthday anniversary, Henry Ford stated that in his lifetime he has witnessed many unsettled conditions following military and economic warfare. Then he added the punch line:

> *"Actually each of these periods was only temporary and from each of them we learned. We emerged a little more intelligent."*

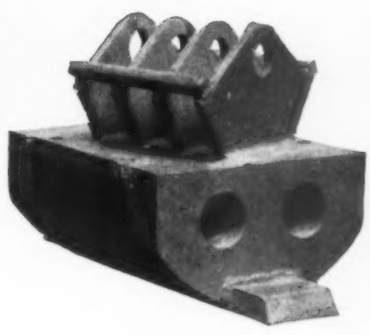
Thus, learning to make stepping stones out of stumbling blocks has given American industry the greatest earning power in the world, typified by such steps as...

Look, Mr. Ford, **what one enterprising manufacturer earned and what he learned in the designing of products:**

IMPROVE . . . IMPROVE . . . IMPROVE with Welded Design

FORMER DESIGN
COST $89.05*.

1ST WELDED DESIGN
COST $91.36**



2ND WELDED DESIGN
COST $72.99**

*** Includes counterweight. Cost does not include pattern development.**

**** Cost includes overhead and counterweights (not shown).**

Courtesy Wellman Engineering Company, Cleveland, Ohio

A MANUFACTURER of clamshell buckets changed over a counterweight sheave block to welded design. Look what he *earned*. The first welded design cost about the same as the former design but helped absorb shop overhead and made production more flexible. BUT, look what he *learned:*

He learned: If the first welded design does not cut costs, it simply means that he does not have the correct answer. By continually thinking in terms of welded design, he can find a *better way at lower cost*. Each improvement becomes a stepping stone to further progress. His second welded sheave block cut the cost 20%.

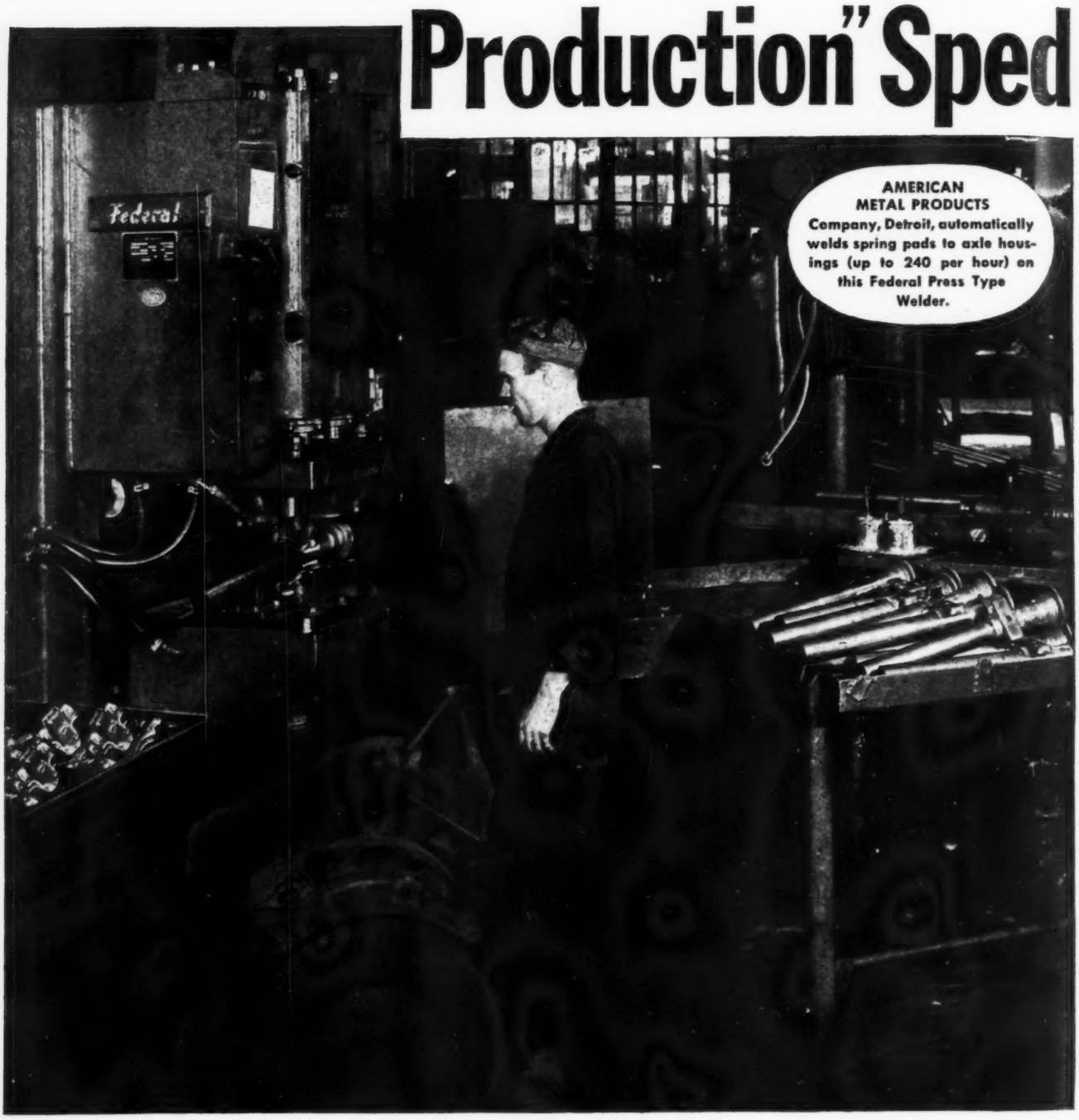
The Lincoln Engineer nearby will gladly help you explore for similar earnings and learnings in your operations. Machine Design Studies free on request to engineers and designers.

THE LINCOLN ELECTRIC COMPANY • Dept. 223 • Cleveland 1, Ohio

America's greatest natural **recourse**

ARC WELDING

Auto Industry Has Many Production" Sped



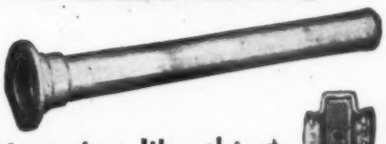
AMERICAN METAL PRODUCTS Company, Detroit, automatically welds spring pads to axle housings (up to 240 per hour) on this Federal Press Type Welder.

THE Federal MACHINE

BULLETIN SP 346—Describing Federal Spot, Flash, Projection, Seam and "Gun" Welders is yours for the asking.

SUBSIDIARIES
Sommer and Adams Co., Cleveland—SPECIAL HIGH PRECISION MACHINES
The Warren City Mfg. Co., Warren—WARCO PRESSES and PRESS BRAKES

Examples of "Necessities by Federal RESISTANCE WELDERS



For instance, you can take a heavy-gauge steel tube like this, which is a rear axle housing component, and a heavy-gauge stamping like this, which is a spring pad; insert them in a Federal PA-4 Press Type Welder with simple dies (shown left) and they come out as though one piece of metal . . . but stronger. Fifteen seconds total time. That's four pieces a minute.

Note the three nubs projecting inwardly on each side of the saddle portion of the stamping. At these points of contact between stamping and tube, welds initiate. Under heat and pressure the parts are forged together in these areas, the junctures becoming stronger than surrounding parent metal.

To the vast saving of time, against previous joining methods, add time savings on final assemblies and great economy in material, resulting from this design. (Heavy castings were used where lighter but tougher stampings now do the job).

There you find the reasons why industries noted for making the most of needed goods at the lowest cost are largest users of Federal Resistance Welders.

This is typical of hundreds of Federal welded jobs produced by the American Metal Products Company of Detroit, makers of quality parts for many industries. It is typical too, of thousands of other production-speeding, cost cutting methods possible with Federal Resistance Welders.

Every delay of full-scale production for the dammed-up needs of world markets through shortages of material or of work makes the need for eventual production speed more important . . . lowering of unit costs more urgent. When you find out (through the Federal Engineering Service nearest you) how you can cut cost and time in YOUR production with automatic welding, be sure that you get Resistance Welders by Federal.

APPLIANCES

RADIO PARTS

ACCESSORIES

UTENSILS

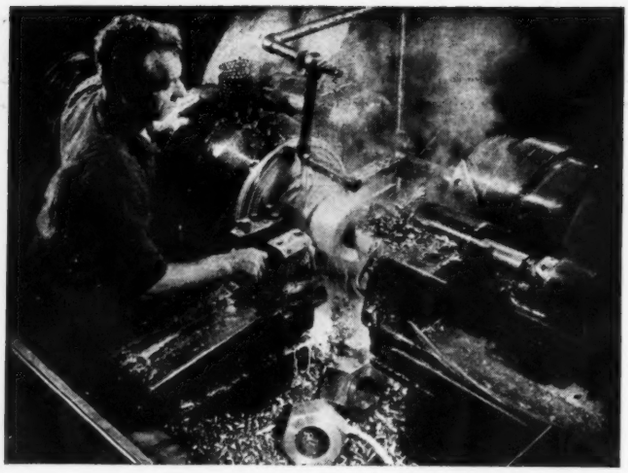
PRODUCTION SHORT CUTS

PROJECTION WELDED
Thousands of variations of the typical items above are produced at low cost on Federal Welders described in Bulletin 4520

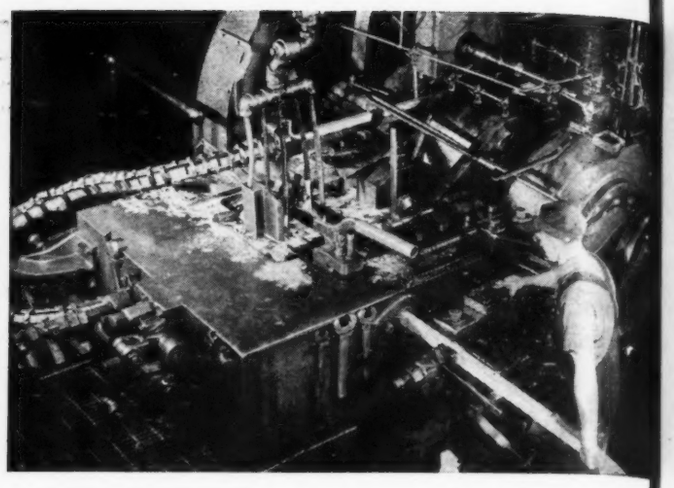
AND WELDER COMPANY

MEMBER RESISTANCE WELDER MANUFACTURERS' ASSOCIATION RWMA

214 DANA STREET • WARREN, OHIO



LARGEST NUTS—EMPIRE Nuts larger than 1½" bolt size are produced on machines of this type, especially adapted to RB&W requirements. Sizes up to 6½" across the flats are processed.



WORLD'S LARGEST—This cold-punching machine, fed rectangular bars, punches the hole, cuts the blank, chamfers, retrims, repunches to clear and center the hole, burnishes the sides — everything but tapping.

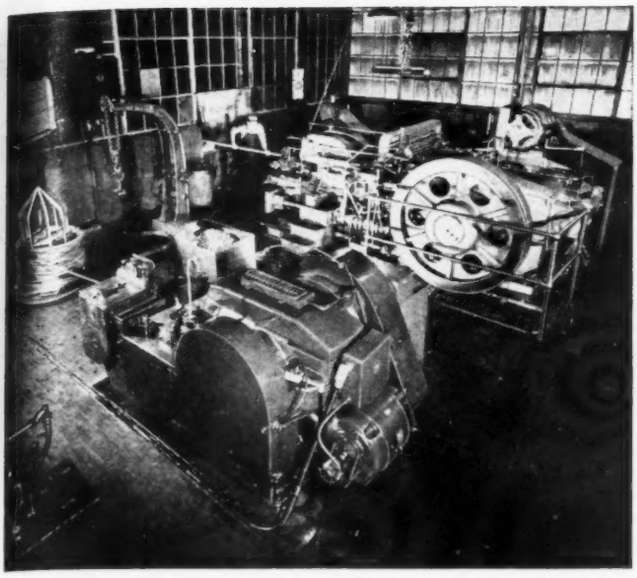
We spent millions . . .

TO SAVE YOU MONEY

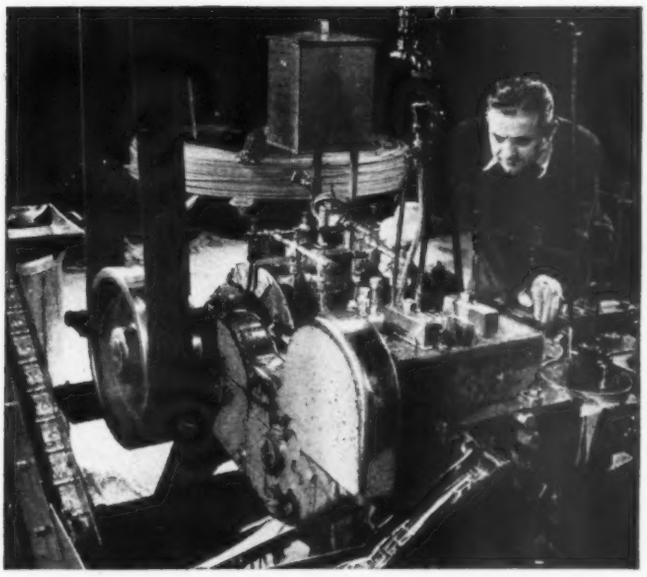
ACCURATE BEARING—RB&W Semi-finished Nuts have an accurate bearing surface at right angles to the axis of the thread. Special facing equipment and quality control insure satisfaction.

You pay no more for RB&W EMPIRE Nuts, when you buy their superior strength, accuracy and finish . . . and you also get freedom from assembly trouble and the permanent dependability assured by the millions RB&W has invested in special equipment and quality control.

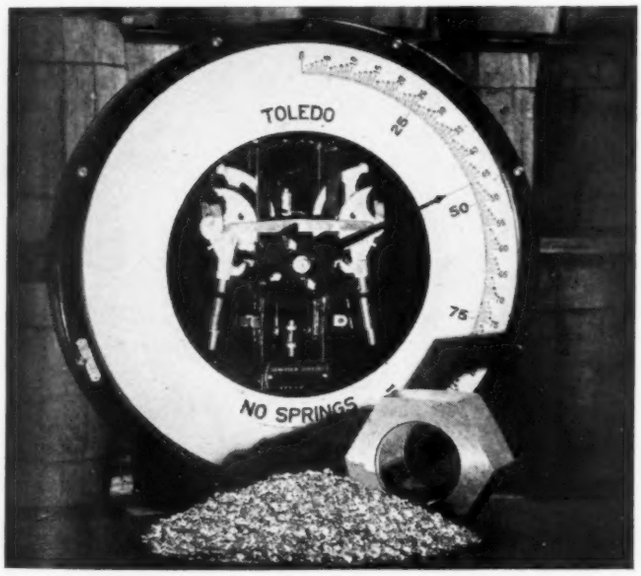
Quality control is found in actual processing as well as in the laboratories and inspection departments. For example, the method of cold-punching which RB&W developed has the valuable asset of insuring continuous inspection as part of the manufacturing process. Faulty bars cannot escape detection . . . the nuts must be uniform in size . . . and the hole must be central and concentric after repunching.



NEWEST MACHINES—RB&W works constantly to develop and perfect new processes. These machines are radically different in design and principle . . . are the only ones of their kind in the world.



HIGHEST SPEED—One thousand ¼-inch Square Nuts a minute is the pace of this machine which eats up a ton of steel every three hours. The raw material is cold-rolled in RB&W's own bar mill.



WIDE RANGE—RB&W produces light, regular and heavy nuts, hot-pressed, cold-punched, semi-finished and slotted. The 11,040 6-32 nuts in the pile are equal in weight to the single 4″ nut.

LARGEST PLANT—RB&W's Coraopolis (Pa.) plant is the world's largest devoted exclusively to manufacturing cold-punched nuts. Several millions of nuts are produced and shipped each day.

RB&W The complete quality line

101 YEARS *Making strong the things that make America strong*

Plants at: Port Chester, N Y., Coraopolis, Pa., Rock Falls, Ill. *Sales Offices at:* Philadelphia, Chicago, Chattanooga, Los Angeles, Portland, Seattle. *Distributors* from coast to coast. By ordering through your distributor, you can get prompt service for your normal needs from his stocks. Also, the industry's most complete, easiest-to-use catalog.

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

GIVE YOUR COMPRESSORS A NEW LEASE ON LIFE

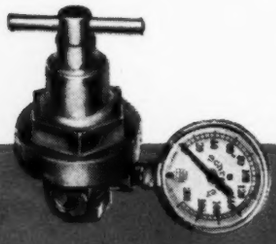
Are you throwing money out the window by overworking your compressors, by demanding too much air where less will do, by decreasing production efficiency through variable, unregulated pressures? No air equipment using cylinders and valves can give the expected results—unless pressure is uniform and constant.

Schrader Air Pressure Regulators will save you money! They'll let you cut the air demands on your compressor from high to low. Air regulated lines mean longer compressor life and reduced maintenance cost, and you'll get better work.

Write for complete information and literature. Dept. A99-6.

AIR PRESSURE REGULATOR

1844 1946

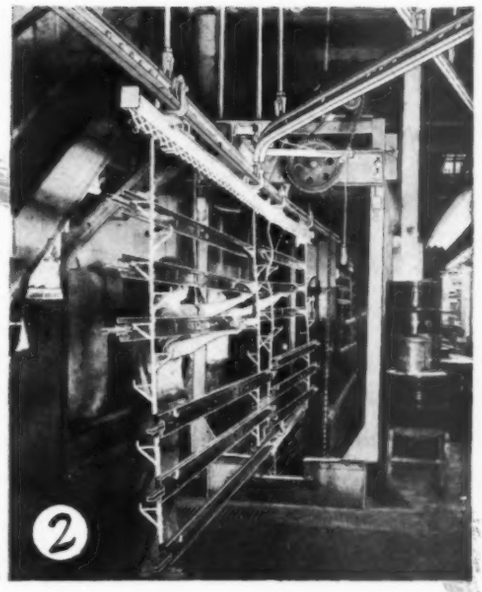


Everything for Efficient Air Control

● Air Cylinders, Operating Valves 2, 3 and 4-way (hand, foot and remote control), Safety and Operating Controls, Air Ejection (Knockout) sets, Pneumatic Machine Controls, (all types), Quick Acting Couplers, Blow Guns, Air Hose and Fittings, Hydraulic Gauges.

Schrader
PRODUCTS
CONTROL THE AIR

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Inc.*, BROOKLYN 17, N. Y.



AMERICAN MONORAIL *System* Uses Power for SPOT Handling

Extreme flexibility of movement is carefully maintained in this hand operated American MonoRail System. Where quick change of trolley travel or passage of carrier through process is required, power driven equipment takes care of such spots as . . .

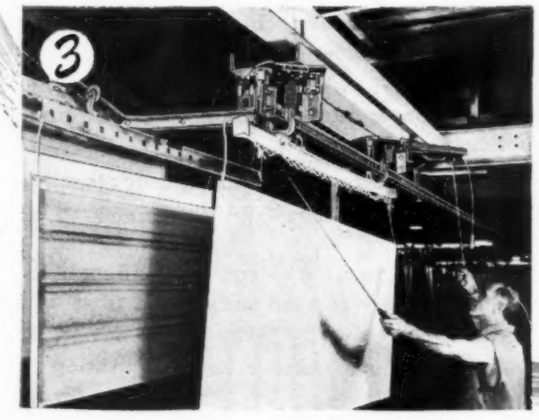
1. Trolleys on parallel tracks automatically brought into single track alignment by solenoid operated switch.

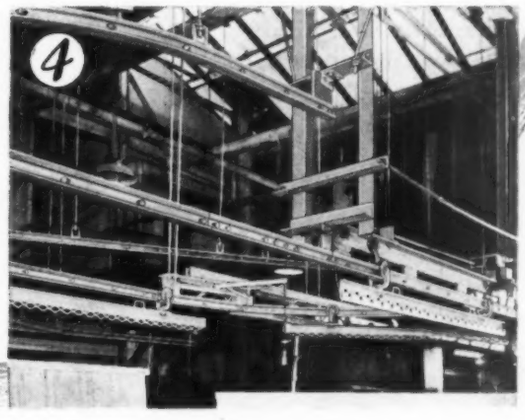
2. Carriers roll on track sections for *vertical* passage through degreasing tank. Cleaned parts move down the line to spray booths.

3. Crosstrack switches provide 90° transfer to shipping area as carriers roll off power conveyor in finishing oven.

4. Empty carriers raised to high level track for gravity return to loading station.

American MonoRail Engineers, with their wide experience in solving difficult handling problems, will gladly consult with you. Send for Bulletin C-1 illustrating hundreds of similar operations.





THE AMERICAN MONORAIL COMPANY

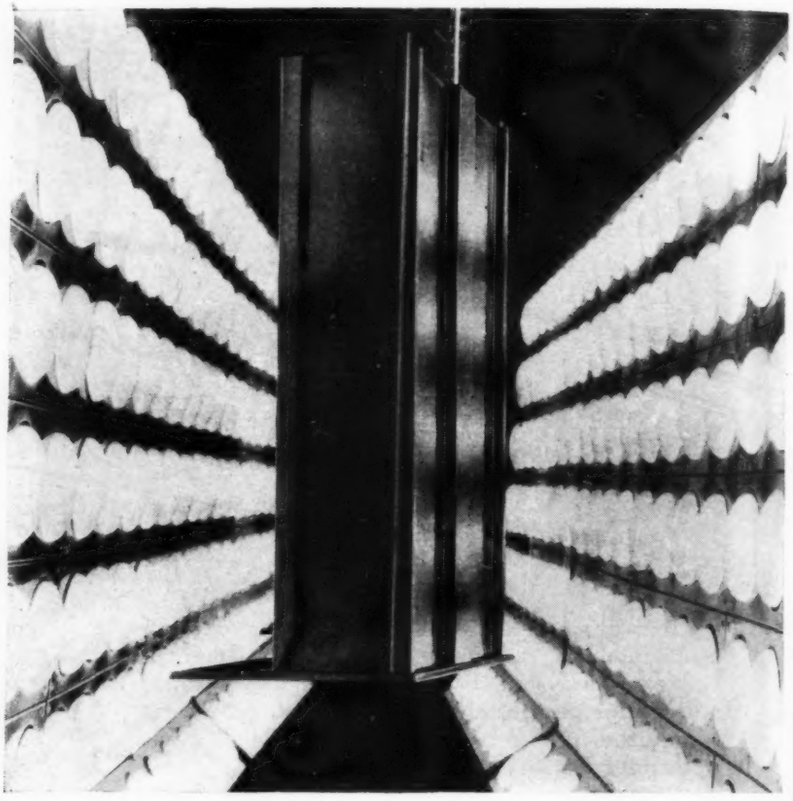
13114 ATHENS AVENUE • CLEVELAND 7, OHIO

INFRARED *Means Production Savings*

For BAKING • DRYING • DEHYDRATING • PREHEATING

Typical Example 90% SAVING IN TIME

A steel cabinet manufacturer cut finish baking time to 8 MINUTES from a previous 80-minute time range. The Fostoria EVENRAY System gave him this faster, more economical production and reduced rejects.



EVENRAY SYSTEM **fostoria**
FOR BAKING • DRYING • PREHEATING • DEHYDRATING

Trade Mark Reg. U. S. Pat. Off.

Hundreds of Applications for Production Savings

BAKING of all types of protective coatings on metal, wood, etc.

DRYING ceramics, latex, glue, ink, sand molds ,wet motors, etc.

DEHYDRATING textiles, paper, chemicals, foods, leather, etc.

PREHEATING plastics, metal parts, glass, greases, etc.

Write For Literature

A brochure, EV-1245, describes EVENRAY SYSTEMS and shows typical installation photos. Portable equipment catalogs also available.

THE CHOICE OF OVER 4,000 MANUFACTURERS IN THIS COUNTRY AND ABROAD ... *Because—*

1. Evenray models utilize GOLD on all oven interiors for maximum efficiency. Gold is the best reflector of infrared rays — 98% efficient.
2. Evenray's 2-wall construction, in conjunction with GOLD interiors, provides double insulation against heat losses.
3. Evenray's FIRST COST is economical because component parts of each customer-made system are manufactured on mass-production basis.
4. Evenray Systems are designed to accommodate all clear and reflector type infrared lamps available today — up to and including 1000 watts.
5. Evenray Systems are flexible — can be added to or altered quickly and easily. They can be suspended from ceiling, and made to fit current production lines.
6. Evenray Systems are listed under Re-examination Service of Underwriters' Laboratories.

THE FOSTORIA PRESSED STEEL CORP. Fostoria, Ohio

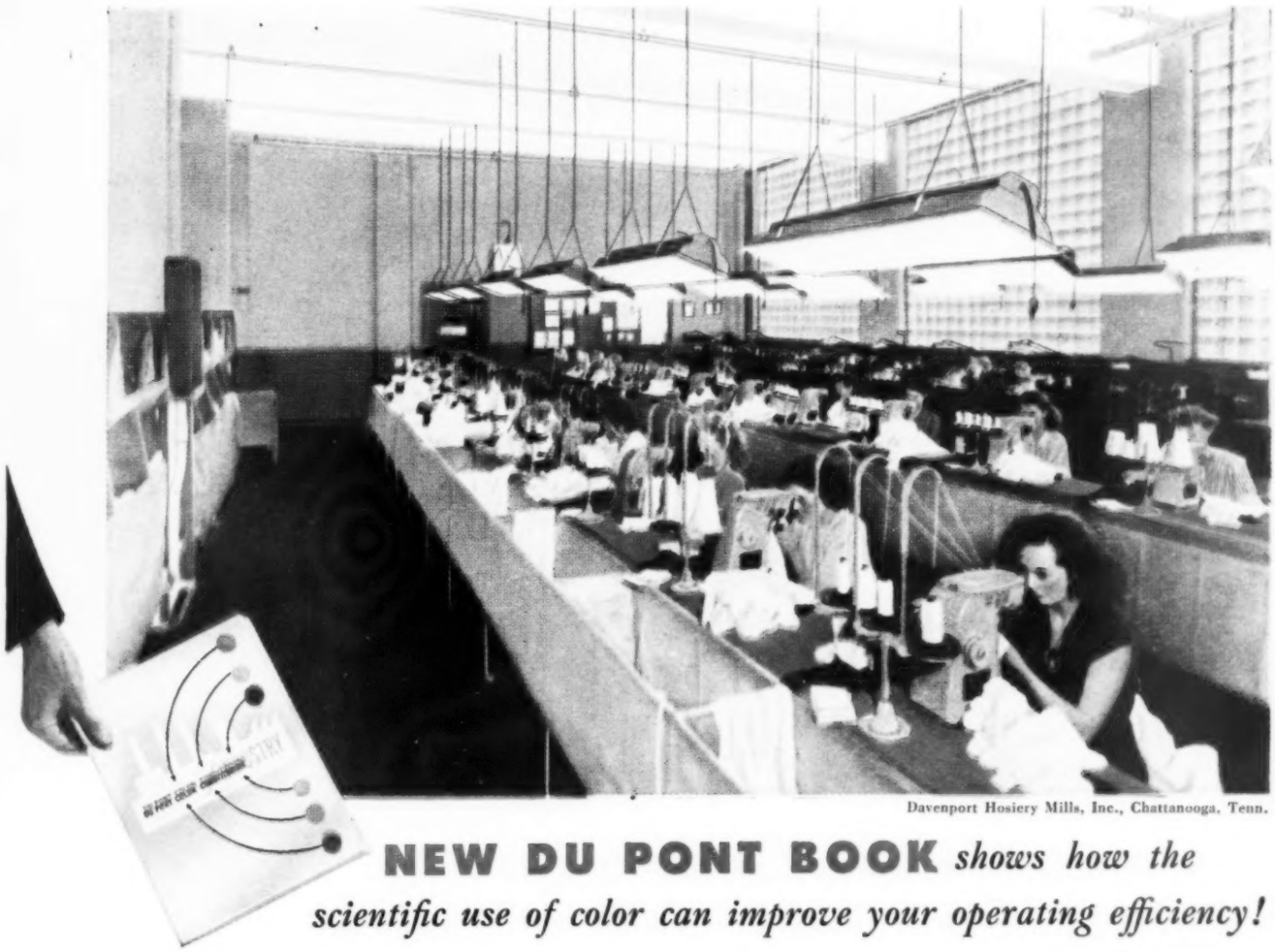
Specialists in Infrared Heating and Industrial Lighting Equipment

Locations of Fostoria Industrial Service Centers

Atlanta	Cleveland	Kansas City	New York	Portland, Ore.	IN CANADA
Boston	Dayton	Los Angeles	Oakland	St. Louis	Amalgamated Electric Corp., Ltd.
Buffalo	Denver	Milwaukee	Omaha	Salt Lake City	and all Northern Electric Branches
Chattanooga	Detroit	Minneapolis	Philadelphia	Seattle	
Chicago	Indianapolis	New Haven	Pittsburgh		

PRODUCTION UP...PROFITS UP

with Du Pont Color Conditioning



Davenport Hosiery Mills, Inc., Chattanooga, Tenn.

NEW DU PONT BOOK *shows how the scientific use of color can improve your operating efficiency!*

YOU'LL FIND the complete story of DU PONT COLOR CONDITIONING in this authoritative new book, just off the press. Typical case histories show how you can use color profitably in your plant—in shop areas, offices, washrooms and cafeterias. COLOR CONDITIONING FOR INDUSTRY is a "must" on the reading list of every executive and maintenance man concerned with the efficiency and welfare of his employees.

This practical plan has paid worthwhile dividends in hundreds of industrial plants throughout the country. It helps you select scientifically correct colors for walls, machinery and equipment. See how COLOR CONDITIONING can help you cut worker fatigue and boost production. Mail the coupon today!

DU PONT
REG. U. S. PAT. OFF.

Color Conditioning

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.), Dept. F-12
Finishes Division, Wilmington 98, Del.

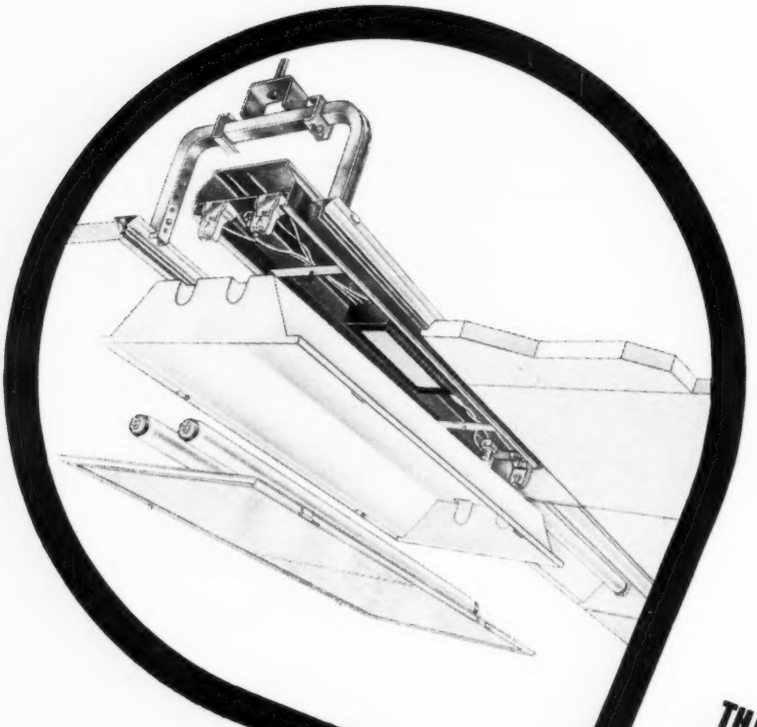
Please send me free of charge your new 32-page book that shows what COLOR CONDITIONING can do for my plant.

*Name*_____ *Title*_____

*Firm*_____

*Address*_____

*City and State*_____



Installed in a commercial area of any size — the MILLER FLUORESCENT TROFFER LIGHTING SYSTEM gives you (1) perfect light for easy-seeing; and (2) a distinctive, impressive ceiling treatment. Good lighting is made an integral part of the architecture! Furthermore, you get a saving! The continuous wireway channels reduce wiring costs, conduit and conduit fitting costs, from 50% to 80%. The patented Miller Ceiling Furring Hanger improves and simplifies installation. The versatility of application of the Troffer System offers limitless design opportunity — CEILINGS UNLIMITED — while fulfilling its primary purpose — IDEAL LIGHTING.

THE LIGHTING SYSTEM THAT PROVIDES CEILINGS UNLIMITED

MILLER
SINCE 1844

THE MILLER COMPANY • MERIDEN, CONN.

ILLUMINATING DIVISION

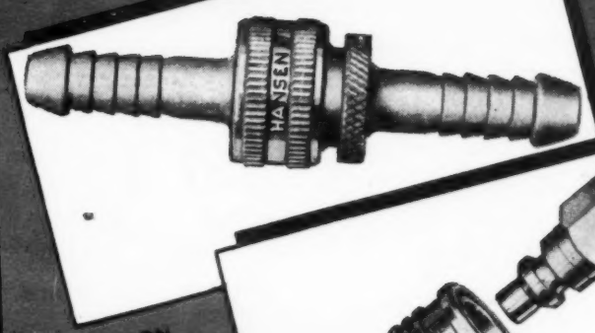
ILLUMINATING DIVISION
Fluorescent, Incandescent Mercury Lighting Equipment

ROLLING MILL DIVISION
Phosphor Bronze and Brass in Sheets, Strips and Rolls

FOUNDRY DIVISION
Non-Ferrous Metal Castings

HEATING PRODUCTS DIVISION
Domestic Oil Burners and Liquid Fuel Devices

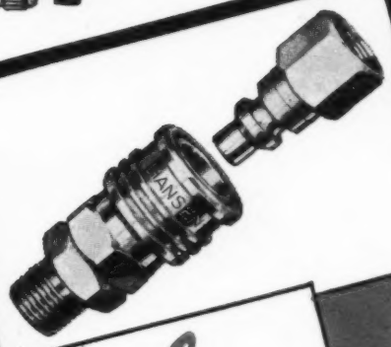
HANSEN



UNION STEMS

HOSE CLAMPS

OXYGEN COUPLING



HOSE STEM

Industrial
AIRLINE EQUIPMENT

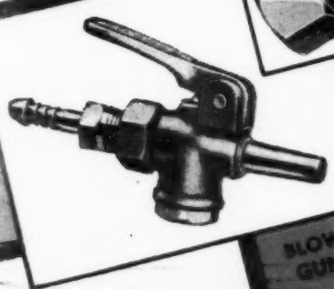
For over a quarter of a century Hansen airline equipment has not only pioneered and paced the field but has acquired an international reputation as the finest "precision made" equipment of its kind.

Our engineers, highly specialized, have had years of experience in creating, designing and introducing to industry new and improved equipment which has met with tremendous success, as is evidenced by the users of Hansen equipment. From the largest industrial plants in the world down to the small ones, you will find Hansen equipment widely used. Hansen equipment has proven its worth, particularly in plants where peak production, economy, time and labor savings are essential.

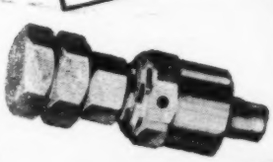
GASOLINE COUPLING

PUSH-TITE COUPLING

ACETYLENE COUPLING



BLOW GUN



SWIVEL NUT HOSE CLAMP

HANSEN MFG. CO.
1786 EAST 27TH STREET
CLEVELAND 14, OHIO

SAVE TIME

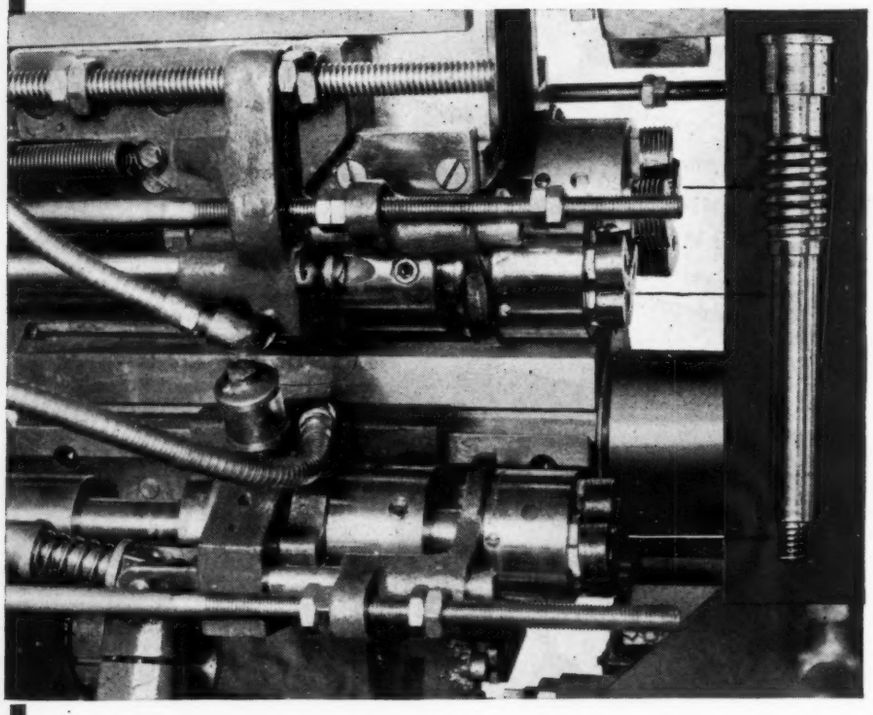
and you save money

Your material costs, and your hourly wage rates, are just about the same as your competitor's. Both are trending upward.

This means higher selling prices, or lower margins. Often it means both.

The one cost factor that is still flexible, within broad limits, is *machine time.*

Acme-Gridley Multiple Spindle Bar and Chucking Automatics, by producing precision metal parts *faster*, are making a lot of cost sheets look better.



An every-day Example

This stainless steel (Type 303) valve stem, 6½" long, ⅞" in diameter, requires 11 separate operations.

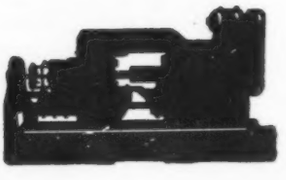
An Acme-Gridley Bar Automatic, 1¼"-6 spindle, completes the job in 49 seconds machine time, 73 finished pieces per hour.

That's FAST for a precision job.

Not a special-purpose machine—it can be quickly tooled to do a thousand complicated jobs that require high precision.

Acme-Gridley Automatics are versatile machines—they have a place wherever precision parts are made in quantities.

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS Maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

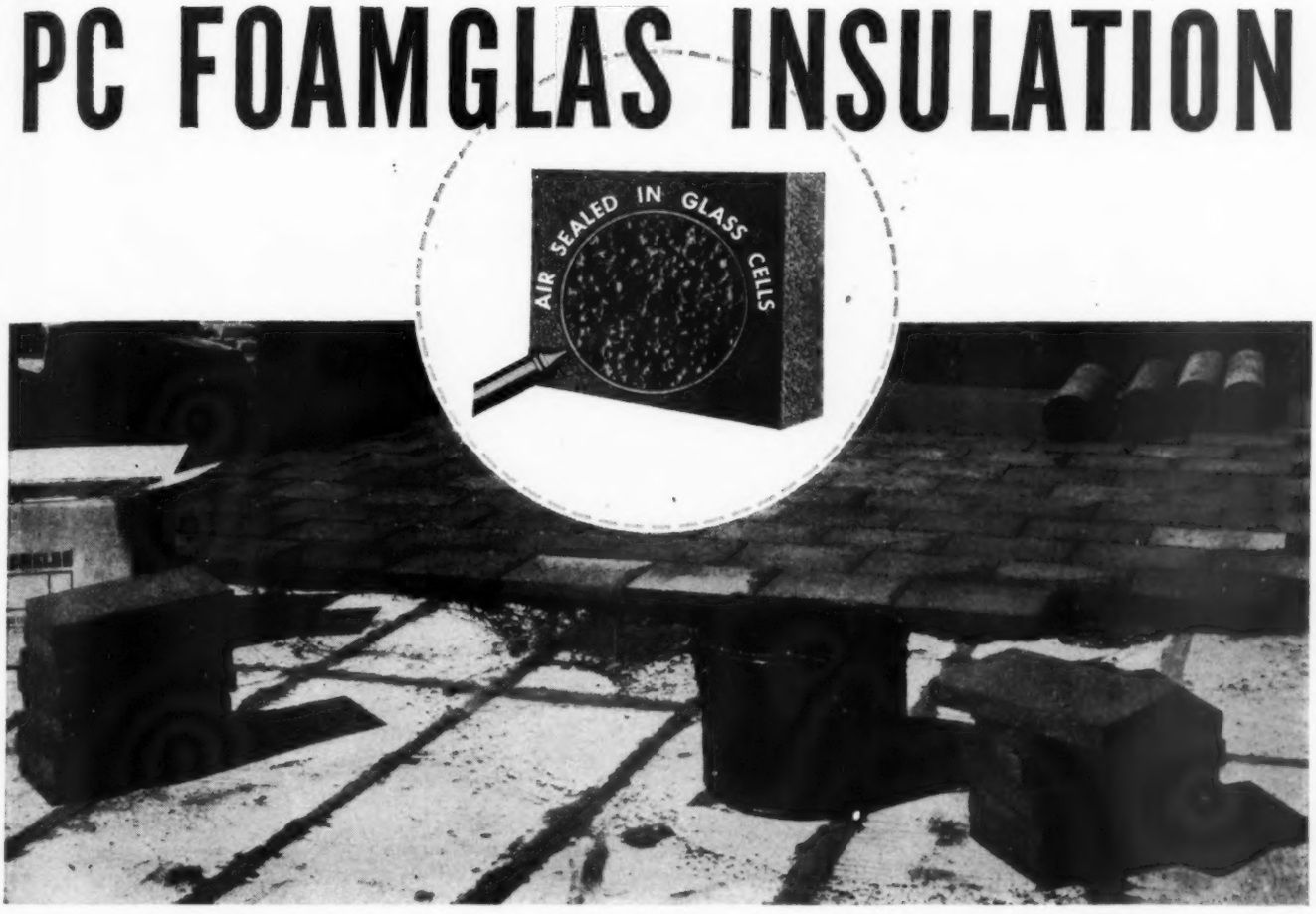


THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

SAVE TIME AND MONEY WITH

PC FOAMGLAS INSULATION



An important cost factor in insulating jobs is the labor cost of installing the insulating material. And men who have used many kinds of insulation can tell you that PC Foamglas is so light in weight, so conveniently packaged, that it can be installed more quickly by fewer men — saving both time and money.

PC Foamglas, the cellular glass insulation, is fireproof, waterproof and verminproof. It is unaffected by excessive humidity, impervious to common acids. It therefore retains its original insulating efficiency indefinitely, without repairs or maintenance. That means protection against the additional cost which is incurred when defective insulating material has to be torn up and replaced.

In walls and floors, on flat deck roofs, of all sorts of plants all over the country, PC Foamglas is helping to maintain desired temperature levels, to minimize condensation, economically, *permanently*.

You will find a lot of helpful information in our manuals on PC Foamglas insulation. Lavishly illustrated, they contain valuable engineering data, tables, charts and installation details. Check your choice on the convenient coupon, mail it to us and free copies of our booklets will be sent to you promptly, without obligation. Pittsburgh Corning Corporation, Room 196, 632 Duquesne Way, Pittsburgh 30, Penna.

Also Makers of PC Glass Blocks

LIGHT IN WEIGHT, rigid and strong, PC Foamglas is conveniently packaged for easy handling on the job. It can be installed quickly by minimum crews, thus saving time and labor cost.

Pittsburgh Corning Corporation
Room 196, 632 Duquesne Way
Pittsburgh 22, Pa.

Please send me without obligation, your free booklets on the use of PC Foamglas insulation for:

Roofs_____ Walls_____ Floors_____

Name_____

Address_____

City_____ State_____

PC FOAMGLAS *Waterproof Fireproof* **INSULATION**

T. M. REG. U. S. PAT. OFF.

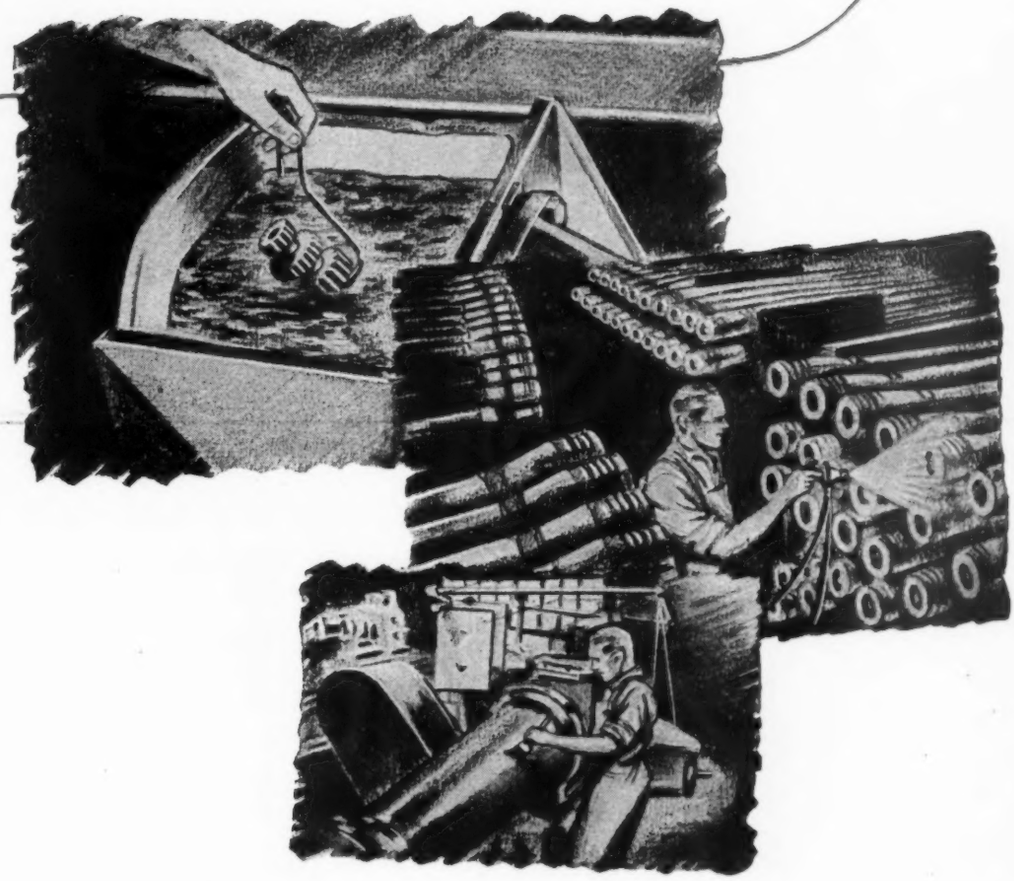
• If you use wire rope, you know what tough service your blocks and sheaves must face: repeated heavy strains and jerks—slewing operations when they are batted against a wall, the side of a bin or dropped into sand, rock, water and jammed full of grit and other abrasives.

Tough service it is. And it is for just such service that American wire rope blocks and sheaves were built.

Look at them carefully: you'll see heavy pins and axles that meet your load requirements; you'll see thick plates and reinforcing straps. Hooks and shackles are *forged*—real insurance against failure on the job. Sheaves are cast from special grade hard iron or cast steel with deep, smooth-finished grooves and high thick flanges that protect your rope.

You see American blocks and sheaves wherever wire rope is used—ample evidence that for trouble-free line work, you might well go "American" on your next order.

Rust Protection for all metal surfaces WITH Tycol NO-RUST-OLS



Easily applied—swab, dip or spray
Prevents salt-spray corrosion
Readily removed
Approved for use on government material

Yes . . . the new Tycol No-Rust-Ols are powerful rust preventives, engineered for easy application on *all* metal surfaces. These performance-proved protective products eliminate surface rust formations on stock in storage . . . parts in production . . . and machinery awaiting use.

Your nearest Tide Water Associated office will give you the complete facts about the "rust protection" afforded by new Tycol No-Rust-Ols. Call them today.

TYCOL
INDUSTRIAL LUBRICANTS

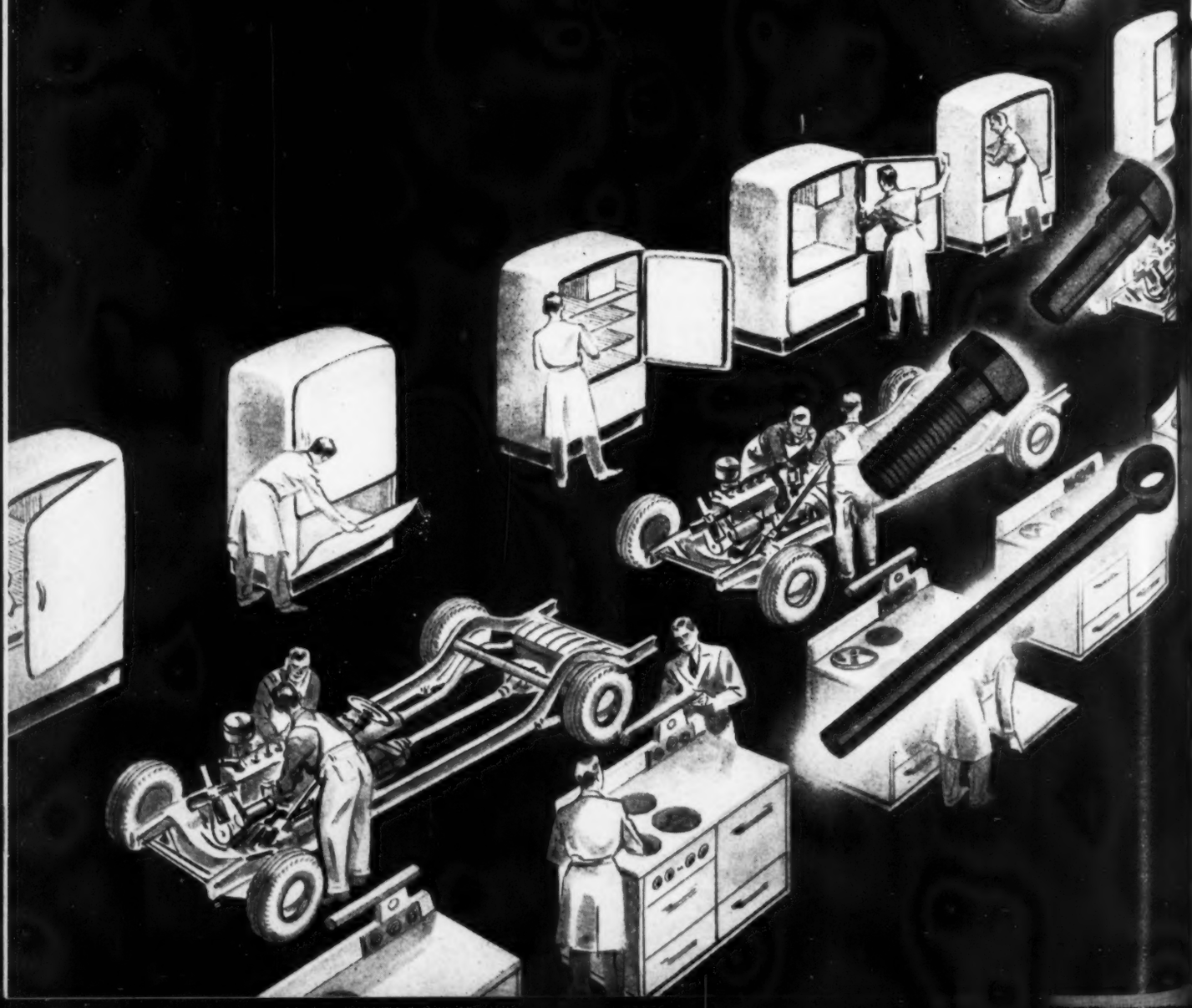
Boston • Charlotte, N. C.
Pittsburgh • Philadelphia

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

LUBRICATION—"ENGINEERED TO FIT THE JOB"

MERGING PRODUCTION LINES..

Raise America's Standard of Living!



MODERN INDUSTRIAL

FASTENERS

BOLTS, NUTS, RIVETS, SCREWS, SPECIAL FASTENERS

Make joints strong and secure

The great production lines that make our automobiles, refrigerators, appliances and machines of all kinds are, themselves, the consumers of other mass-produced items, notably Industrial Fasteners. Because of the highly-perfected manufacturing methods used in making bolts, nuts, rivets, screws and special fasteners, manufacturers employing these products are assured of lower costs, faster assembly, dependable joints.

Designers of machinery, appliances and structures of all kinds use Industrial Fasteners with complete confidence in the strength and security of the joints. Fabrication problems are simplified by the dependable uniformity of modern fasteners. For example, nuts made by the tens of thousands according to this industry's standards fit perfectly the bolts which may be made by a different company at a different place; specially designed industrial fasteners and other parts are made economically in large quantities on a basis which permits complete interchangeability. Thus, the Industrial Fasteners industry helps materially in making available to the American public better automobiles, radios, appliances, machines, at lower cost.

AMERICAN INSTITUTE OF BOLT, NUT AND RIVET MANUFACTURERS

1550 HANNA BUILDING • CLEVELAND 15, OHIO

SYLVANIA NEWS
INDUSTRIAL EDITION

DEC. *Prepared by* SYLVANIA ELECTRIC PRODUCTS INC., Salem, Mass. 1946

TYPICAL SYLVANIA FLUORESCENT INSTALLATION LIGHTS PACIFIC MILLS TEXTILE PLANT

EVERY INDUSTRY NEEDS PERFECT LIGHTING FOR EFFICIENT PRODUCTION

High over-all fluorescent illumination in Pacific Mills textile plant at Lyman, South Carolina. This type of Sylvania installation can save man hours by decreasing risk of injury. Increase production with the best in lighting!

Pacific Mills plant equipped with Sylvania Fluorescent Lighting throughout. Virtually glarefree fluorescent lighting clearly defines equipment and work surfaces, providing high general illumination as well.

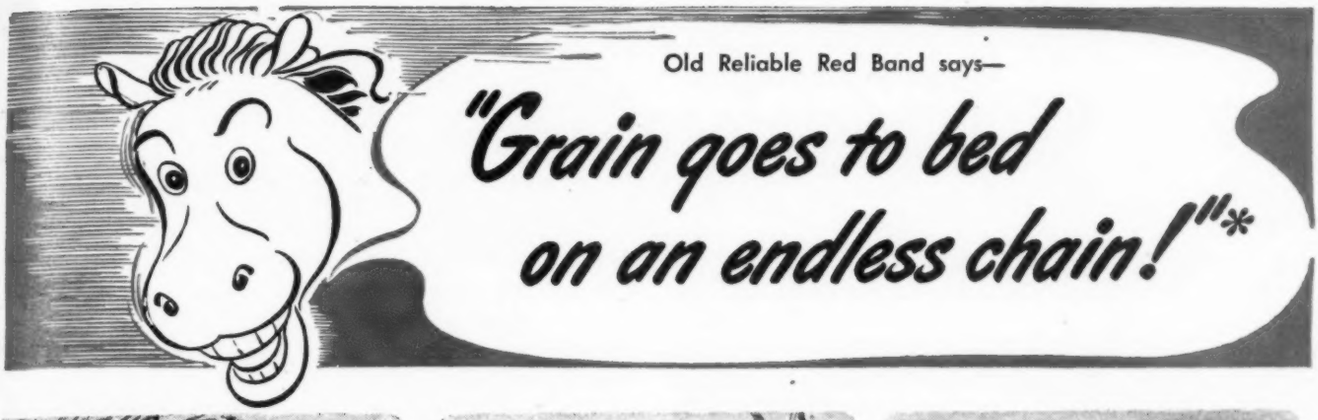
By cutting down possibility of accidents, Sylvania lighting keeps workers healthier and happier. Workers are more efficient and give better quality of work. *You* save man hours — *your* production increases!

Good lighting guides the eye to the focal point of interest and gives high general illumination as well—*without glare!* Sylvania industrial fixtures are scientifically shielded to prevent painful glare.

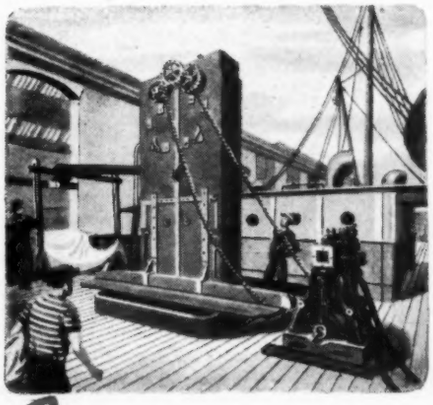
For installation information concerning *your* plant, check the biggest line and the best—see a Sylvania Distributor or write *Sylvania Electric Products Inc., Salem, Mass.*

SYLVANIA ELECTRIC

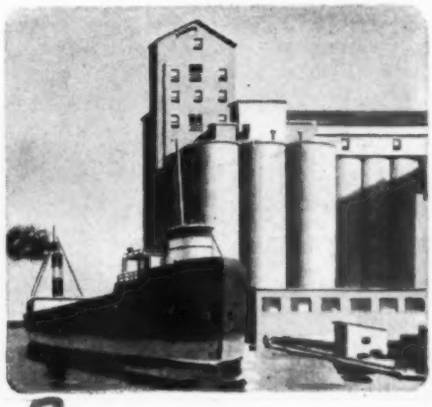
MAKERS OF FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; ELECTRIC LIGHT BULBS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES



1 Early American settlements had community granaries like those of Biblical times for winter storing of grain. In 1834, the first modern grain elevator was built in Buffalo. By 1866, bulk handling of grain was an established industry.



2 Chains of buckets were run, by cumbersome ropes and countershafts, from one central power source on the ground floor. In 1896 came the biggest improvement to date—individual motors were developed to drive each conveyor unit separately.



3 Today, with electrical horsepower, a Buffalo grain elevator can unload grain from lake carriers at the rate of 85,000 bushels an hour. Howell has been building specialized motors for grain elevators and other industries since 1915.

Have you a hard job for Horsepower?

Perhaps you have a process where extremely high or low temperatures exist—excessive moisture—high starting torque—or just a real tough job for a motor. Then get a protected industrial type motor that's built to "take it."

Here's why industrial type Howell Motors stand up:

(1) Precision-built of finest materials, with copper or bronze rotors, and completely insulated.

(2) Smooth-operating because statically and dynamically balanced.

(3) Designed for the toughest tasks in industry—consequently better-performing on *all* jobs.

See your nearest Howell Representative for your needs in specialized or standard motors up to 150 h.p. Remember, you pay no more for industrial type Howell Motors—and you always get top quality for your money.

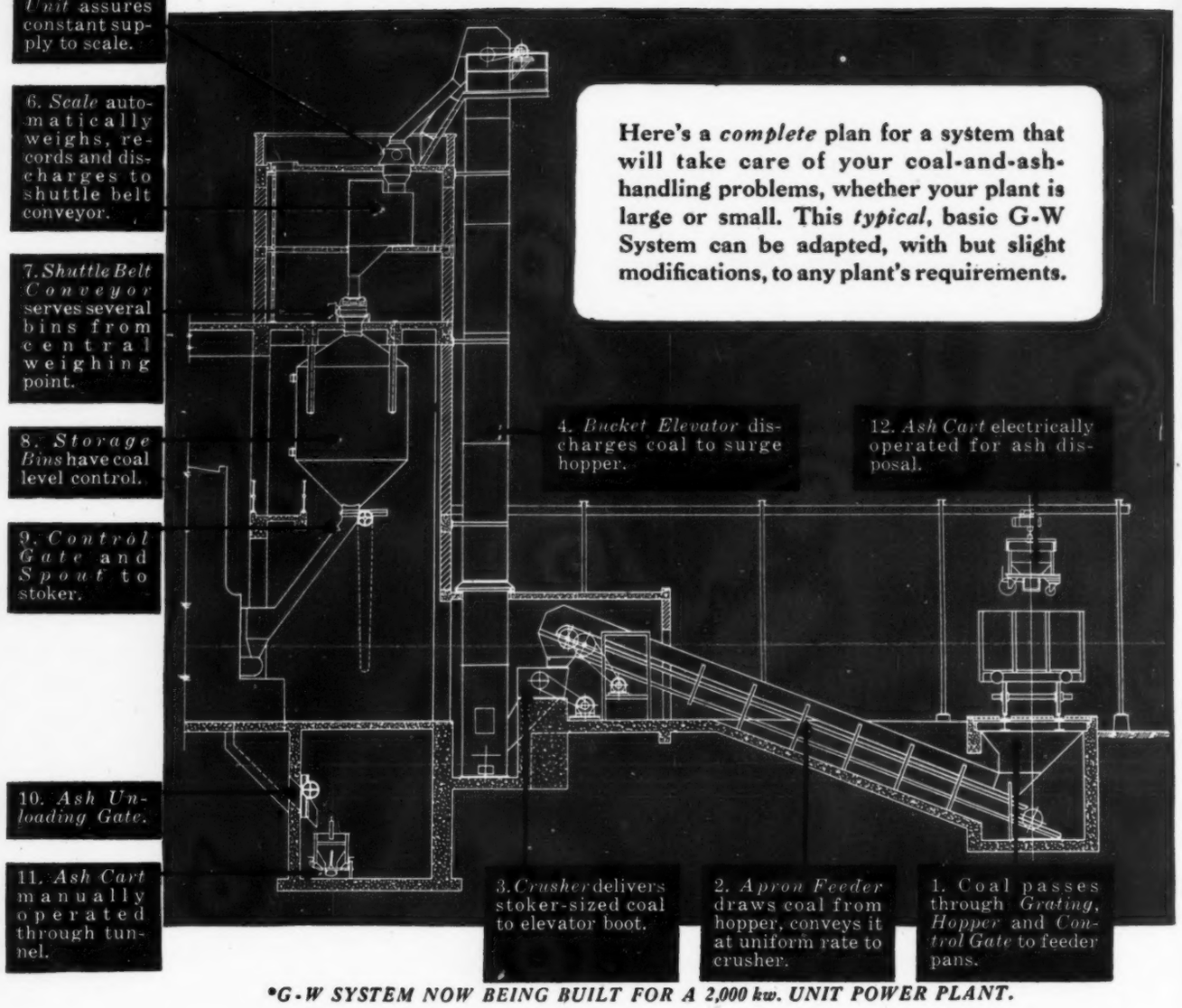
Howell Protected Type Motors available in sizes 5 h.p. and smaller. Also other sizes of Howell industrial type motors available up to 150 h.p.

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

This *one* basic blueprint* solves *all* problems in coal-and-ash-handling


5. Surge Hopper Control Unit assures constant supply to scale.
6. Scale automatically weighs, records and discharges to shuttle belt conveyor.
7. Shuttle Belt Conveyor serves several bins from central weighing point.
8. Storage Bins have coal level control.
9. Control Gate and Spout to stoker.
10. Ash Unloading Gate.
11. Ash Cart manually operated through tunnel.
Here's a complete plan for a system that will take care of your coal-and-ash-handling problems, whether your plant is large or small. This typical, basic G-W System can be adapted, with but slight modifications, to any plant's requirements.
4. Bucket Elevator discharges coal to surge hopper.
12. Ash Cart electrically operated for ash disposal.
3. Crusher delivers stoker-sized coal to elevator boot.
2. Apron Feeder draws coal from hopper, conveys it at uniform rate to crusher.
1. Coal passes through Grating, Hopper and Control Gate to feeder pans.

*G-W SYSTEM NOW BEING BUILT FOR A 2,000 kw. UNIT POWER PLANT.

COAL IN... ASHES OUT

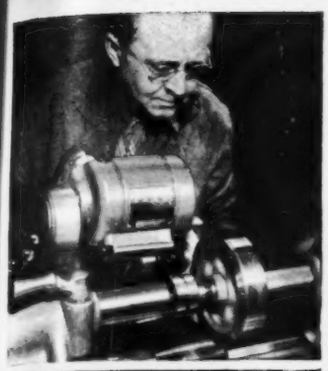
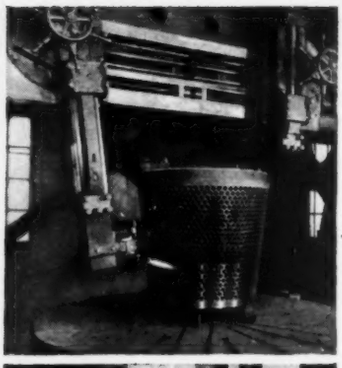
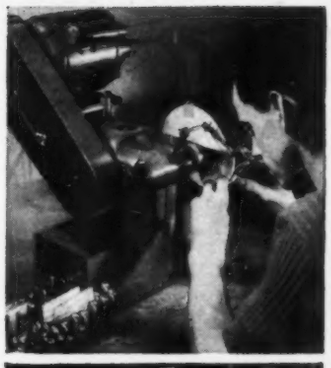
HANDLING HEADQUARTERS
for Industrial Conveying and Elevating Equipment . . for Infra-Red Baking and Drying Equipment . . . for Ice Handling Tools and Ice Processing Machines.

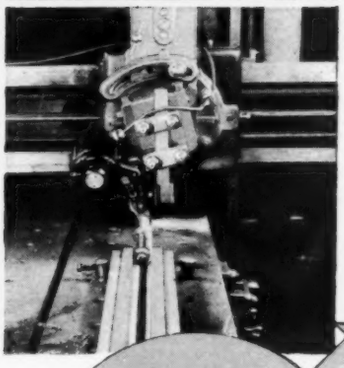
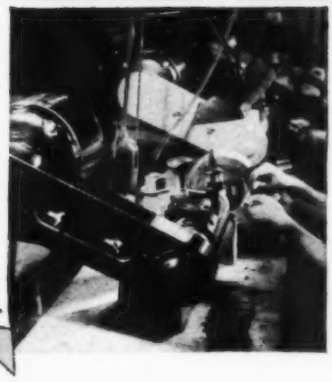
G-W HANDLES IT...
faster • easier • cheaper

G-W will do the complete job. From start to finish G-W shoulders full responsibility for all details of design, manufacture, and erection. You save the time and money usually spent in dealing with sub-contractors. Two-way assurance that G-W will install the coal-and-ash-handling equipment that's best for your plant: hundreds of satisfied G-W equipment users; more than 130 years' experience in designing material-handling equipment for all types of industries. Gifford-Wood Co., 420 Lexington Ave., New York 17, N. Y.; 565 W. Washington St., Chicago 6, Ill.—Factory: Hudson, N. Y.

1660

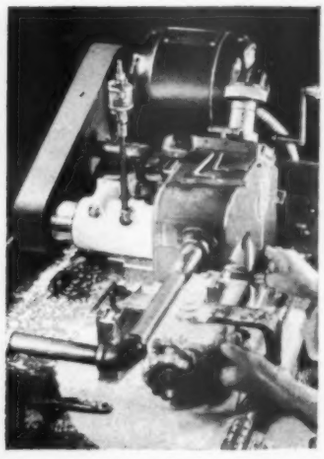
GIFFORD-WOOD
SINCE 1814

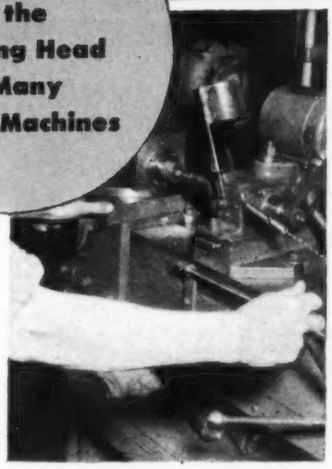



More Grinders Mount on all Basic Machine Tools

Dumore Grinders can be Applied to Hundreds of Bench-Mounted Jobs



A Dumore Grinder is the Grinding Head of Many Special Machines



You Can Solve a Lot of Different Grinding Problems with a Dumore Grinder . . .

By Doing All Types of Grinding in a Variety of Set-ups, a Dumore Gives You Complete Facilities at Low Cost

When you have a Dumore, you don't need to invest in expensive special machines. Your Dumore mounts on basic machine tools now in your shop — converts them into precision grinders. The illustrations on this page show how you can also use Dumores bench-mounted, and as work-heads on special units of your own design. In any application, you can rely on their high precision and year-after-year dependability.

These adaptable and versatile tools have been used for all types of grinding — internal, external, thread, tool, and many special types. Ask your nearby distributor to help you select the size and type for your needs. Power range is from 1/14 to 1 HP — speeds up to 42,500 RPM. Interchangeable quills provide internal grinding capacity to 24" depths. Write for complete information.

The Dumore Company, Dept. L-21, Racine, Wisconsin

DUMORE

PRECISION TOOLS

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

TEAR OUT COUPON AND MAIL TODAY!

FREE . . .
76 page illustrated manual of unusual grinding methods

THE DUMORE COMPANY, Dept. L-21
Racine, Wisconsin

Please send without obligation my copy of *Here's How*, your manual of the newest techniques in grinding.

Name.....Position.....

Company.....

Address.....

City.....(.....) State.....

INSTALL *longer life* FEDERAL Cold Cathode

FLUORESCENT LIGHTING

for *adequate* illumination levels and reduced maintenance costs

FEDERAL precision-built lamps and fixtures are fully guaranteed for one year (except lamp breakage).

Industrialite

Extremely high reflector efficiency, over 91% in the four lamp model. Designed for easy installation, these units may be used in continuous rows to reduce service wire requirements. *One* three wire outlet required for *72 feet* of 4 lamp units.

Curvelite

Maximum diffusion with minimum loss of efficiency. Louvers have hinging action for easy lamp accessibility. This attractive fixture is one of Federal's full line available for office or other locations requiring well diffused lighting.

A complete line of newly styled, precision engineered Federal fixtures is *immediately available* for every lighting need.

Special finishes available for units exposed to corrosive atmospheres.

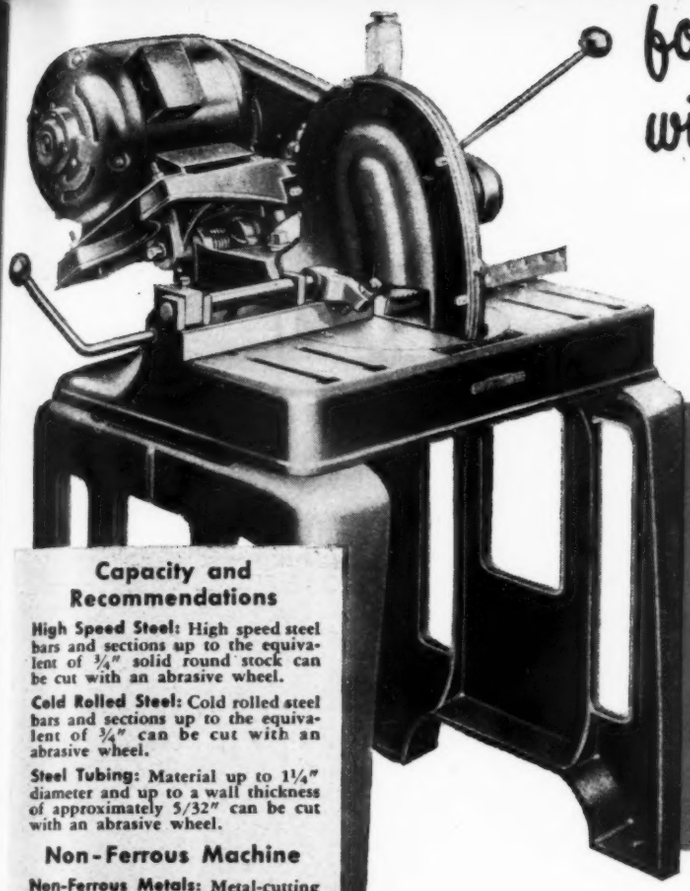
For further information and prices, address Lighting Division

FEDERAL ELECTRIC COMPANY, INC.

8700 South State Street • Chicago 19, Illinois

for fast, accurate cutting of a wide variety of materials...

to exact length, on a production basis...



Delta* Cut-Off Machine

TWO MODELS

1. With abrasive wheel for cutting steel and other materials. (Also available with swing guard for cutting wood.)
2. With special steel blade for cutting non-ferrous materials.

Capacity and Recommendations

High Speed Steel: High speed steel bars and sections up to the equivalent of ¾" solid round stock can be cut with an abrasive wheel.

Cold Rolled Steel: Cold rolled steel bars and sections up to the equivalent of ¾" can be cut with an abrasive wheel.

Steel Tubing: Material up to 1¼" diameter and up to a wall thickness of approximately 5/32" can be cut with an abrasive wheel.

Non-Ferrous Machine

Non-Ferrous Metals: Metal-cutting blades can cut these solid sections;

Soft Brass — up to 1½" diameter.
Half-Hard Brass—up to 1¼" diameter.
Aluminum — up to 1½" diameter.
Aluminum Extruded Sections — up to equivalent of 2 sq. in.
Copper — up to 1½" diameter, or equivalent of 2 sq. in.
Magnesium (Dow Metal) — up to 1¼" diameter.
Micarta and similar rods — up to 1½" diameter.

Metal-cutting blades can cut these *tubular sections:*

Soft Brass, Half-Hard Brass, Aluminum, Copper, Dow Metal, Micarta, and similar tubing — up to 2" diameter.

Very Hard Non-Ferrous Metals: Duralumin Tobin Bronze, Navy Bronze, etc., should be cut with an abrasive wheel, not a saw blade.

Delta tools are typical products of the American way of doing business. In America, we use tools to create more and better things at lower cost than in any other country, and in this way provide better living — for only as people work together to produce more can they have more to enjoy.

Grinders

Band Saws

Abrasive Finishing Machines

Drill Presses

Down go your operating costs, when you use a Delta Cut-Off Machine. It's a sturdy, husky unit that has wide application on many operations now performed by more expensive machines — or done by hand at high cost.

Speedily and safely cuts such materials as metals, plastics, brake linings, carbon, etc. Because the cut is sharp and clean, you eliminate the expense of additional polishing and burring operations.

The Delta Cut-Off Machine is designed for accuracy, fast cutting, and long life. Many sound construction features: Widely-spaced Timken roller bearings in pivot assembly, to assure true wheel travel.... Accurately ground and balanced arbor — running at 4000 R.P.M. — mounted on pre-loaded, lubricated-for-life ball bearings.... Solid steel pulleys, dynamically balanced for smooth operation.... Vibrationless, full-power, 3-belt drive.

You can install famous Delta Cut-Off Machines in your plant at a cost that is but a fraction of the usual price for machines of this type. Consult your Delta distributor. He is listed under "Tools" in the classified section of your telephone directory.

Mail coupon below for free Buletin No. A-20.

*Trade Mark Reg. U.S. Pat. Off.

DELTA MILWAUKEE REG. U.S. PAT. OFF.

Delta Manufacturing Division
Rockwell Manufacturing Company
Milwaukee 1, Wisconsin

ROCKWELL DELTA

Tear out coupon and mail today!

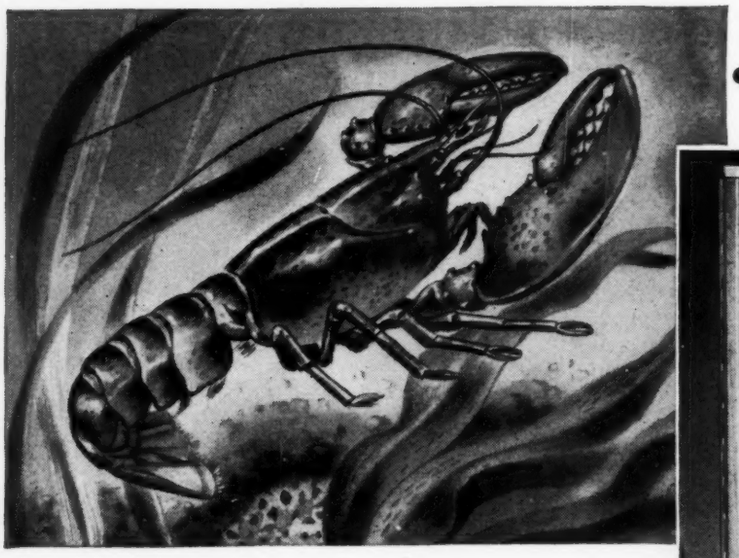
WM-10

DELTA MANUFACTURING DIVISION
619N E. Vienna Ave., Milwaukee 1, Wis.

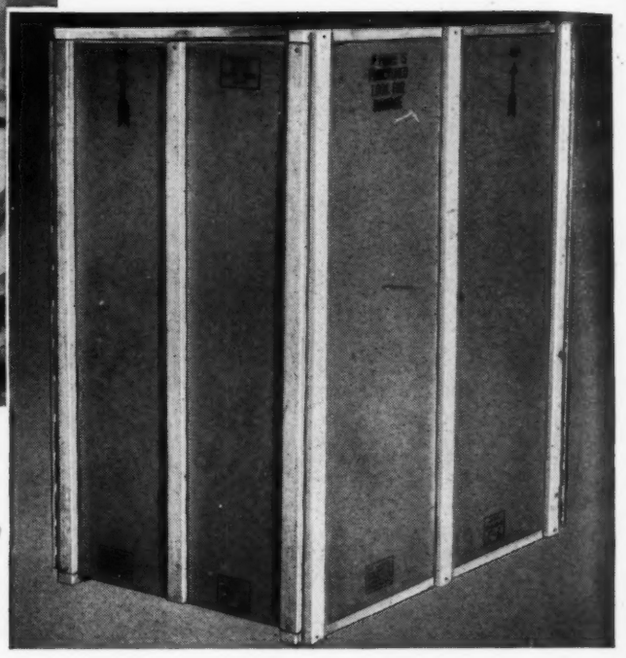
Please send me Bulletin No. A-20 on the Delta Cut-Off Machine.

Name_____
Position_____
Company_____
Address_____
City_____ (_____) State_____

THE CONTAINER IS "PART OF THE PRODUCT"



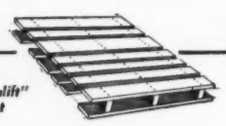
. . . NATURALLY



GENERALLY . . . . .

NEW
"GENERALIFT" PALLETS

Millions of pallets were used by the armed forces. They saved from 50% to 90% in materials handling. We are now in full production of pallets for all industry. Our engineers will design a pallet best suited to your specific needs. Write today for free Pallet Book.



"Generalift" Pallet

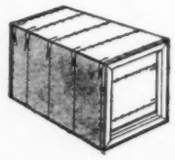
Look to the Lobster

for perfect product protection . . . and look to General for engineered shipping containers that are also a "Part of the Product."

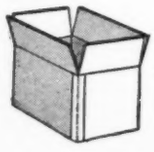
They're laboratory designed for the better, more economical shipment of today's modern products. *Better* because they're compact and often reinforced with blocking and interior protection. More *economical* because they're lightweight and quickly and easily assembled. Result: conservation of space, saving of shipping costs and man-hours, and speeding of production.

Our engineers are broadly experienced in the design of shipping containers for all types of products They will also be glad to help you design a shipping container that is really worthy of *your* product . . . that is actually a "part of *your* product."

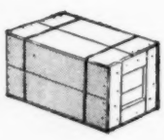
Write today for more information on this important subject. Remember, don't just put it in a box . . . put it in a General Engineered Shipping Container.



General All-Bound Box



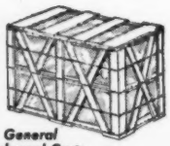
General Corrugated Box



General Nailed Box

Write today for your free copy of booklet on GENERAL'S *"Part of the Product" Plan.*

General Cleated Corrugated Container

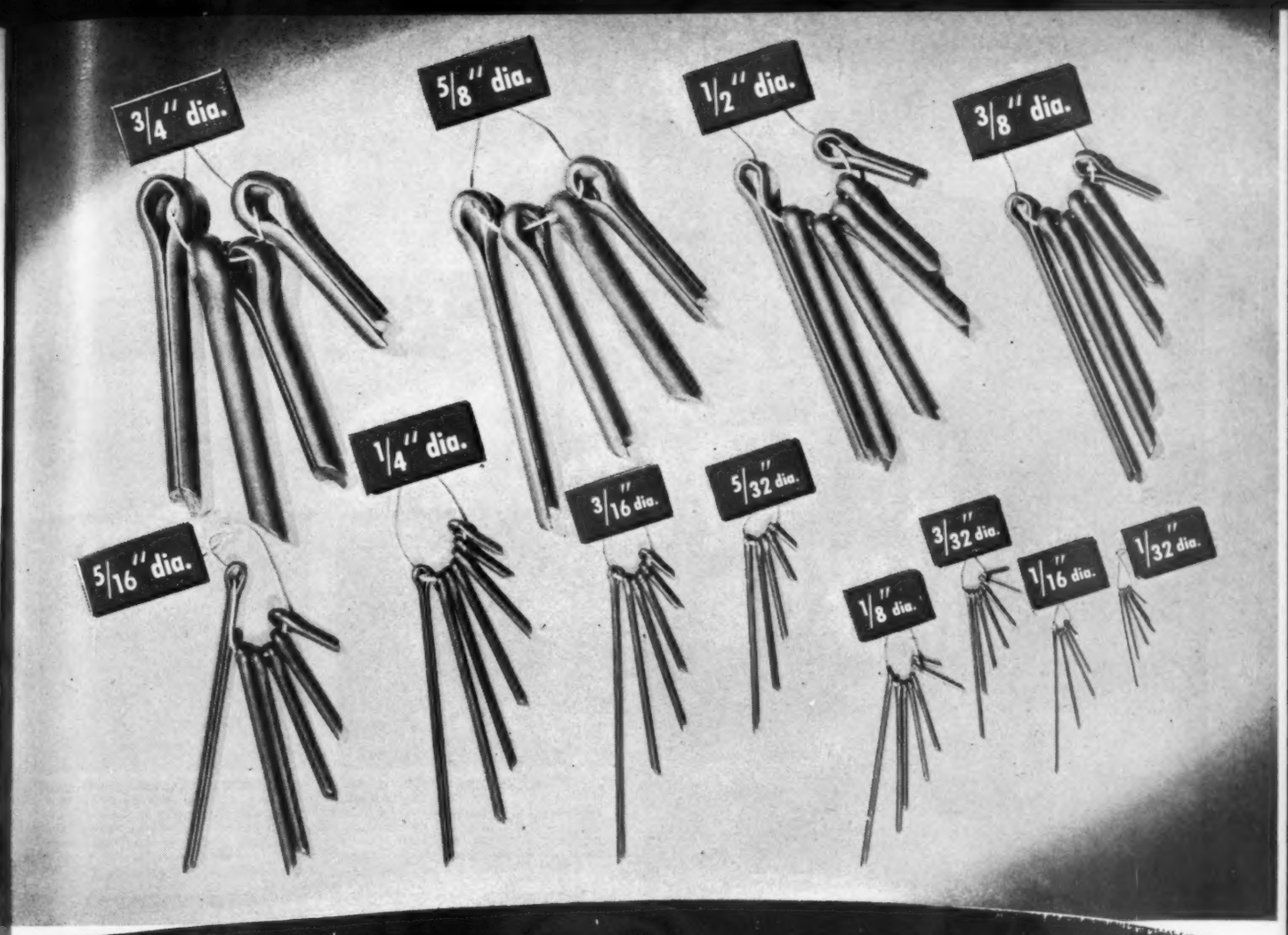


General Wirebound Crate

ENGINEERED SHIPPING CONTAINERS

GENERAL BOX COMPANY

GENERAL OFFICES: **504 North Dearborn St., Chicago 10, Ill.**
DISTRICT OFFICES AND PLANTS: **Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon. Continental Box Company, Inc.: Houston, Dallas.**



COTTERS . . FROM 1/32" x 1/4" TO 3/4" x 24"

along with your bolts and nuts

Our customers find it convenient to obtain bolts, nuts and cotters from the same source —in one shipment and on one bill of lading.

In addition to a full line of steel and brass cotters, Lamson & Sessions produces cotters made of bronze, stainless steel and aluminum alloys, made to your specifications *in production quantities.* Our extraordinary volume production of cotters is maintained by a large battery of machines designed and built exclusively for Lamson & Sessions.

The wire for Lamson cotters is cold rolled in our own plants, insuring control of both size and quality from raw material to finished product. Modern chemical, metallurgical and physical testing laboratories are maintained to insure uniformity of specifications in both standard cotters and those made "special".

The Lamson "Efficiency" point actually speeds up assemblies because of the diagonally cut points, one of which is longer than the other. This type cotter serves as a drift pin in aligning parts. A blow of a wrench or twist of pliers on the point of the longer shank spreads shanks apart quickly. Your jobber can supply you with Lamson cotters out of stock.

THE LAMSON & SESSIONS COMPANY, 1971 W. 85th St., Cleveland 2, Ohio

Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

OLTS AND NUTS · LAG SCREWS · SEMS · LOCK NUTS · CAP SCREWS · COTTERS · SET SCREWS · DARDELET RIVET BOLTS · KEY BOLTS

LAMSON & SESSIONS

Ask your Jobber for the Lamson Line

UDS · STOVE BOLTS · SHEET METAL SCREWS · WIRE ROPE CLIPS · PIPE PLUGS · WEATHER-TIGHT BOLTS · MACHINE SCREWS AND NUTS · SPECIALS

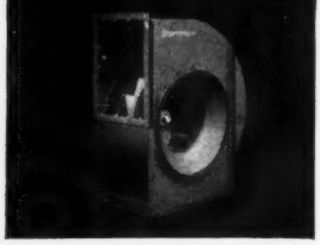
WHAT WE MAKE

Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY · DIVISION OF
Westinghouse Electric

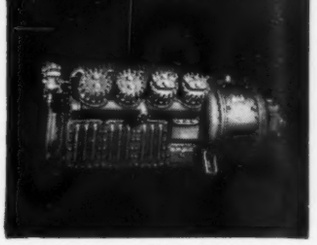
Here's Your

AIR-MOVING

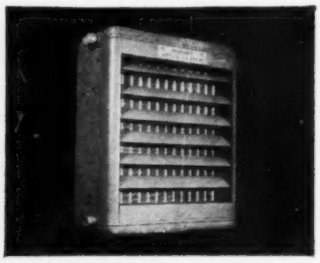


The **SILENTVANE FAN** is one of the most versatile of all air-moving units—performing thousands of jobs in heating, ventilating, and mechanical-draft applications. Available in 19 sizes, this is just one of the many types of blower and exhaust fans listed.

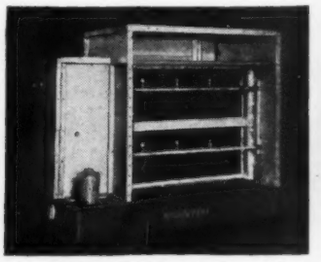
AIR-CONDITIONING



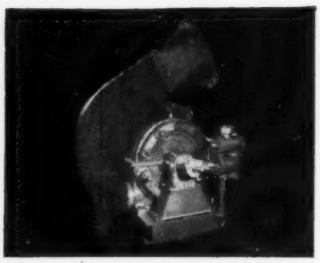
HERMETICALLY-SEALED COMPRESSOR—heart of the air-conditioning system—is designed to save power and prevent refrigerant losses, with completely sealed-in construction and direct motor drive. No shaft seals, belts, pulleys or couplings.



The **SPEED HEATER**—a compact, efficient unit providing fast, economical heat—is typical of Sturtevant's complete line of space heaters for commercial and industrial applications. Whatever your needs, you'll find a Sturtevant unit for the job.



The **SURFACE DEHUMIDIFIER**—another vital component—maintains just the right amount of moisture for comfort or industrial air conditioning. These precision-engineered units are available in 47 standard sizes, to meet every conditioning requirement.



DESIGN 14 CENTRIFUGAL COMPRESSOR provides a dependable source of high-pressure air for pneumatic conveying, furnace blowing, and many other industrial applications. There is a Sturtevant centrifugal compressor to meet your every requirement.

WITHIN-THE-SPACE TYPE UNITAIRE is a compact, self-contained air-conditioning unit—complete with all components and ready for connection to water supply and electric power. Central Plant Type Unitaires also available.

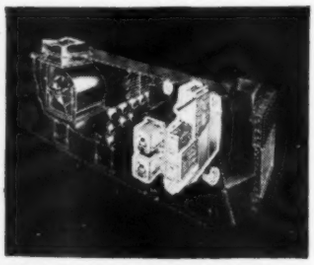
HEATING • VENTILATING • AIR CONDITIONING •

DRYING • DUST AND FUME CONTROL • CONVEYING

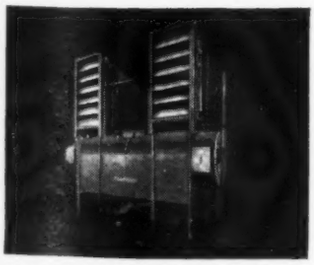
Complete Air-Guide for 1947!

AIR-CLEANING
Clean Air
Air-borne dust carried through ionizer becomes charged with electricity
Dust particles attracted to oppositely charged collector plates and removed from air

WESTINGHOUSE PRECIPITRON,* the electronic air cleaner. Here's how it works: as air passes through the unit, every particle of dust and dirt is first given an electrical charge, then attracted to oppositely-charged plates and removed from the air.



INSTALLED IN A CENTRAL PLANT air-conditioning system, the Precipitron provides a continuous supply of thoroughly-cleaned air, for distribution to all parts of a building. Collected dirt is removed by flushing the plates, manually or automatically.



INDUCED-DRAFT FLY-ASH COLLECTOR —for low-cost separation and collection of flue dust—shows the kind of equipment available for mechanical-draft air-cleaning applications. Separate cyclone and cellular-type dust collectors are also available.

Trademark registered in U.S.A.

The New Sturtevant-Westinghouse Catalog gives you up-to-the-minute answers on all three types of air-working equipment . . . all in one convenient, pocket-size volume

NEVER BEFORE have you been offered so *complete* a book as this! One that contains factual information on the *three* basic types of equipment—for air moving, air cleaning *and* air conditioning.

For when Sturtevant became a division of Westinghouse Electric, it was the first time that all three types of equipment were available from a single manufacturing source. And today, the complete line is included in this convenient, pocket-size volume—the 1947 edition of "What We Make," which is yours for the asking.

HELPS YOU DESIGN...SPECIFY...AND ORDER...FROM THE MOST COMPLETE LINE EVER AVAILABLE FROM A SINGLE MANUFACTURING SOURCE

The new catalog contains 211 pages of concise, condensed information—divided, for easy reference, into the following subjects:

82 Pages of Equipment. Listings, data, and description that will help you select the equipment best suited for any job.

37 Pages of Applications. Photos and facts that show how air is being used profitably in all branches of industry—and how it can work for you.

80 Pages of Engineering. Valuable, authoritative, air-engineering data, tables, formulas, and simplified charts that will help solve your design problems.

A request on your business letterhead brings your copy by return mail. B. F. Sturtevant Company, Division of Westinghouse Electric, Hyde Park, Boston 36, Mass., c/o Dept. F.

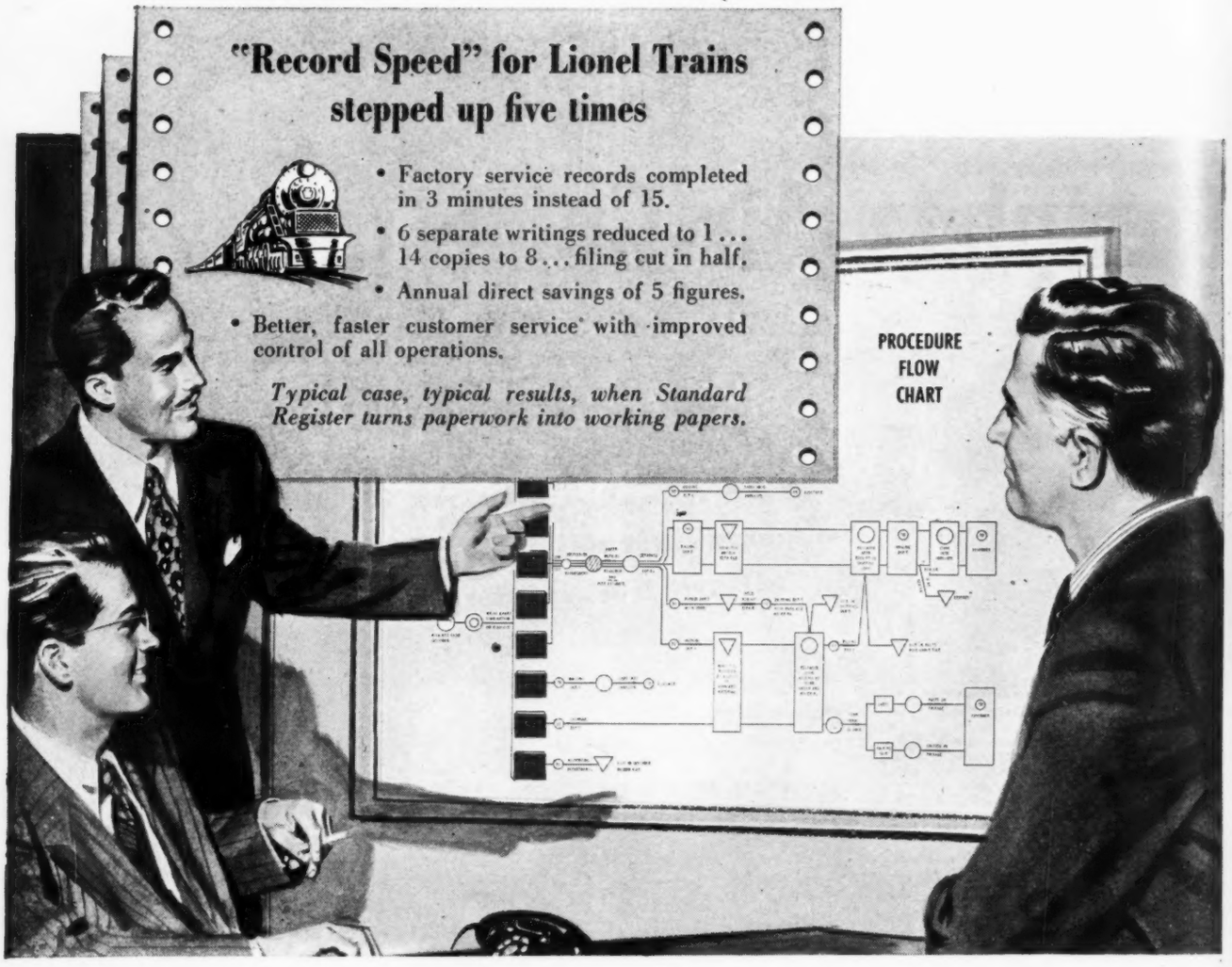
3681—50

Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY • DIVISION OF
Westinghouse ELECTRIC

PRECIPITRON

MECHANICAL DRAFT


"Record Speed" for Lionel Trains stepped up five times
• Factory service records completed in 3 minutes instead of 15.
• 6 separate writings reduced to 1... 14 copies to 8... filing cut in half.
• Annual direct savings of 5 figures.
• Better, faster customer service with improved control of all operations.
Typical case, typical results, when Standard Register turns paperwork into working papers.
PROCEDURE FLOW CHART

Standard Register's exclusive methods save most where record systems cost most

WHY are more and more leading companies calling in Standard Register to overhaul existing record systems? Because they're looking for *big* savings... important savings. And they know that Standard's exclusive, pre-tested procedures are designed specifically for that purpose.

Standard begins by analyzing and flow-charting existing routine... searching out, by pre-tested procedure, form design that makes needless work, methods of writing and using forms that cause needless delays.

Recommendations based on this study generally bring not only 4 and 5 figure direct savings in the cost of completed records but also almost incalculable savings in the over-all cost of operations through better management control.

Phone The Standard Register Co. Sales Office in your city, or write, today, for your copy of "Paperwork Simplification" which shows how Standard's Kant-Slip Continuous forms systems can reduce important *business* costs.

WHERE DO SAVINGS COUNT MOST?

Not in the price of printed forms. A difference in the quality of paper, printing, carbons, etc., may mean a few hundred dollars at most.

Not even in the cost of completed records ... although the cost of writing, handling and using forms is 10 to 50 times the forms' cost... savings here may run into 4 or more figures.

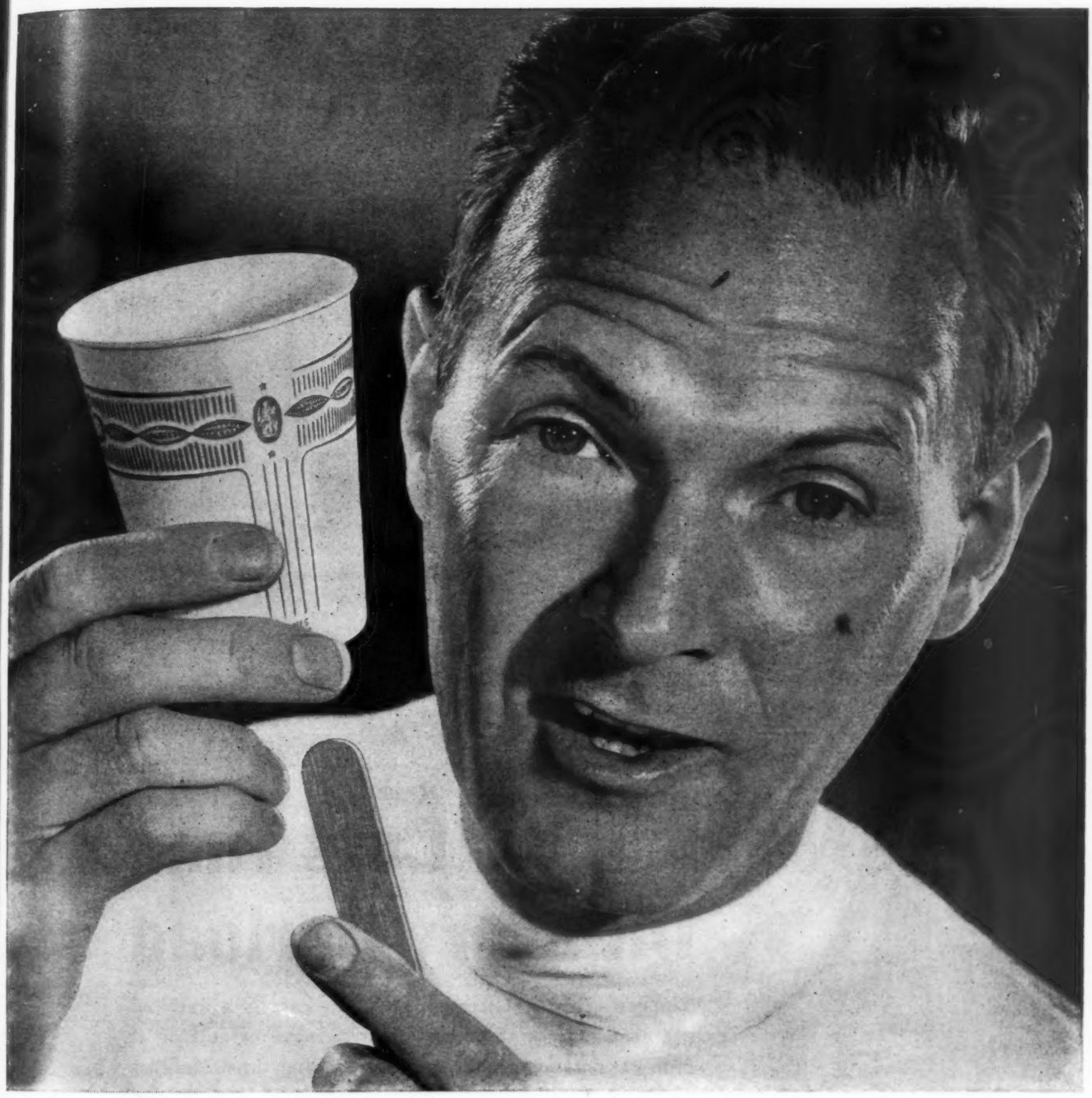
But in the cost of business operation, if waste, delay, inefficiency exist, SAVINGS here, through better management control, can reach almost incalculable figures!

THE STANDARD REGISTER COMPANY

Manufacturer of Record Systems of Control for Business and Industry

312 CAMPBELL STREET, DAYTON 1, OHIO

Pacific Coast: Sunset McKee-Standard Register Sales Co., Oakland 6, California. Canada: R. L. Crain Limited, Ottawa. London: W. H. Smith & Son, Ltd.



"greatest little 'cold-stoppers' in the world... DIXIE CUPS"

In mass feeding operations one of the best ways to prevent the spread of colds is to use Dixie Cups. Germ-free, individual Dixies break the possible chain of contagion resulting from mouth contact where the lips of others have touched. Dixie Cups are a real "safety-first" measure... and protection is better than cure, any time.

DIXIE CUPS, VORTEX CUPS AND PAC-KUP CONTAINERS ARE MADE AT EASTON, PA., CHICAGO, ILL., DARLINGTON, S. C., TORONTO, CANADA

MOBILIFT Cuts Time On Every Carload

Today's critical shortage of freight cars is a national problem. One of the most effective ways of solving it is to cut down car loading and unloading time. Mobilift works rapidly and effectively either from the ground level or from the inside of the car. One man and a Mobilift can move a carload of freight in a few hours—do the same job which might take days for a crew of men with handtrucks. Mobilift saves time, labor and space in your plant—whether it's receiving, processing, warehousing, shipping. Start cutting costs with Mobilift.

MOBILIFT *Moves Materials like a Giant!*

VAUGHAN MOTOR COMPANY ★ 835 S. E. Main Street, Portland 14, Oregon

Sales Offices: 34-48 Steinway St., Long Island City, N. Y. 2430 So. Parkway, Chicago 16, Ill. 107 Walton St., N. W. Atlanta, Ga.

NEW HOW BOOK on battery charging..

This new booklet will tell you how to get a full day's active work from every one of your electric industrial trucks. It explains

. . . **HOW** to get the most from your present battery chargers.

. . . **HOW** to select the G-E Charger best suited to your requirements.

. . . **HOW** and where G-E Chargers should be installed.

. . . **HOW** G-E copper-oxide chargers help cut materials handling costs through reduced maintenance, longer life, less power-cost, and "on-the-spot" charging of lead-acid batteries, nickel-alkaline batteries or both.

For a free copy of this up-to-the-minute booklet and complete information, mail coupon today.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
Section A36-1237
Appliance and Merchandise Department
Bridgeport 2, Connecticut

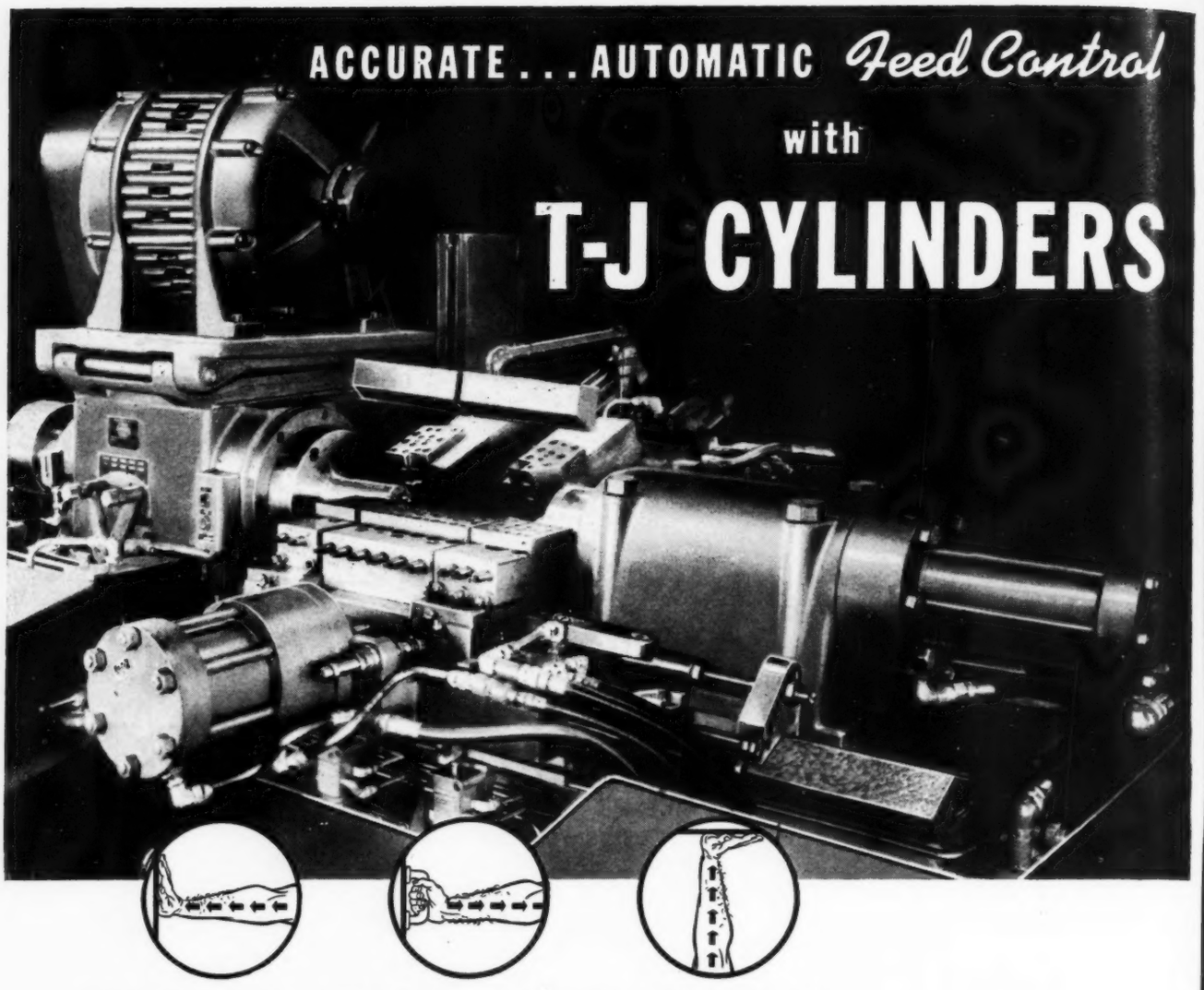
Please send free copy of new "HOW" book on battery charging.

NAME_____

COMPANY_____

ADDRESS_____

ACCURATE . . . AUTOMATIC *Feed Control* with T-J CYLINDERS

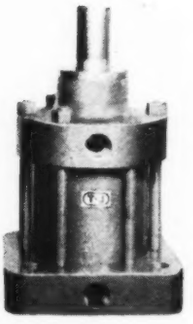


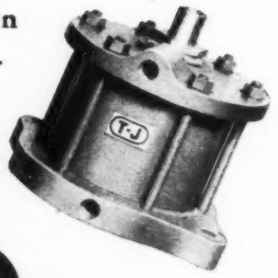
FOR POWER MOVEMENT IN ANY DIRECTION

T-J Cylinders on this Sparks Hydra-Feed Lathe furnish automatic and accurate control for feeding the work to cutters in this multiple tooling set-up.

Another tough job—and T-J Cylinders do it *right!*

More and more today in industries throughout the nation . . . T-J Air and Hydraulic Cylinders are used to simplify operations and save time and labor. For pushing . . . pulling . . . lifting . . . clamping . . . 100 lbs. or 50,000 lbs. Available in many standard sizes and styles . . . both cushioned and non-cushioned types. Backed by 29 years' experience . . . T-J engineered to do the job *better* and *cut costs!* Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.





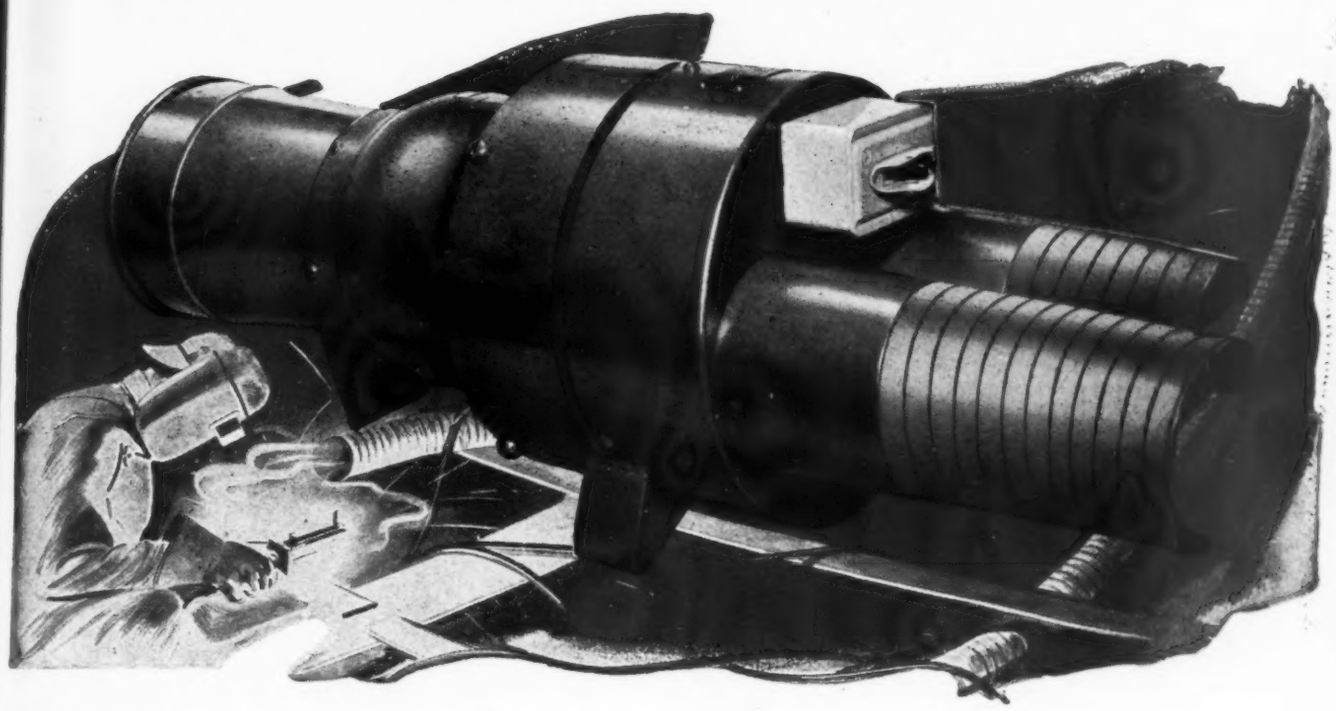
TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

T-J

An Extra Lung for A Man

HAVING TROUBLE BREATHING



The amount of work a man can do goes *down* when foul air comes *in* or the heat goes *up*. Are you giving your workers the equipment that will keep them efficient even when working in hot or noxious fumes?

Many concerns regard Coppus Blowers as "production tools" as well as "safety equipment". They help men to do more work and better work.

You can find in the Coppus line the right blower or exhauster for each "bad spot"—or perhaps one type will handle a variety of jobs. In addition to man-cooling and removing fumes from confined places, Coppus Blowers are used for cooling and drying materials and equipment. They are portable . . . efficient . . . built to Coppus "Blue Ribbon" standards of construction and workmanship in order to withstand severe usage.

Check and mail the coupon for specific information. Address Coppus Engineering Corp., 332 Park Ave., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in SWEET'S CATALOG, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG.

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

COPPUS ENGINEERING CORP., 332 PARK AVENUE, WORCESTER 2, MASS.
Please send me information on the Blowers that clear the air for action.

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausters, welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.

NAME.....

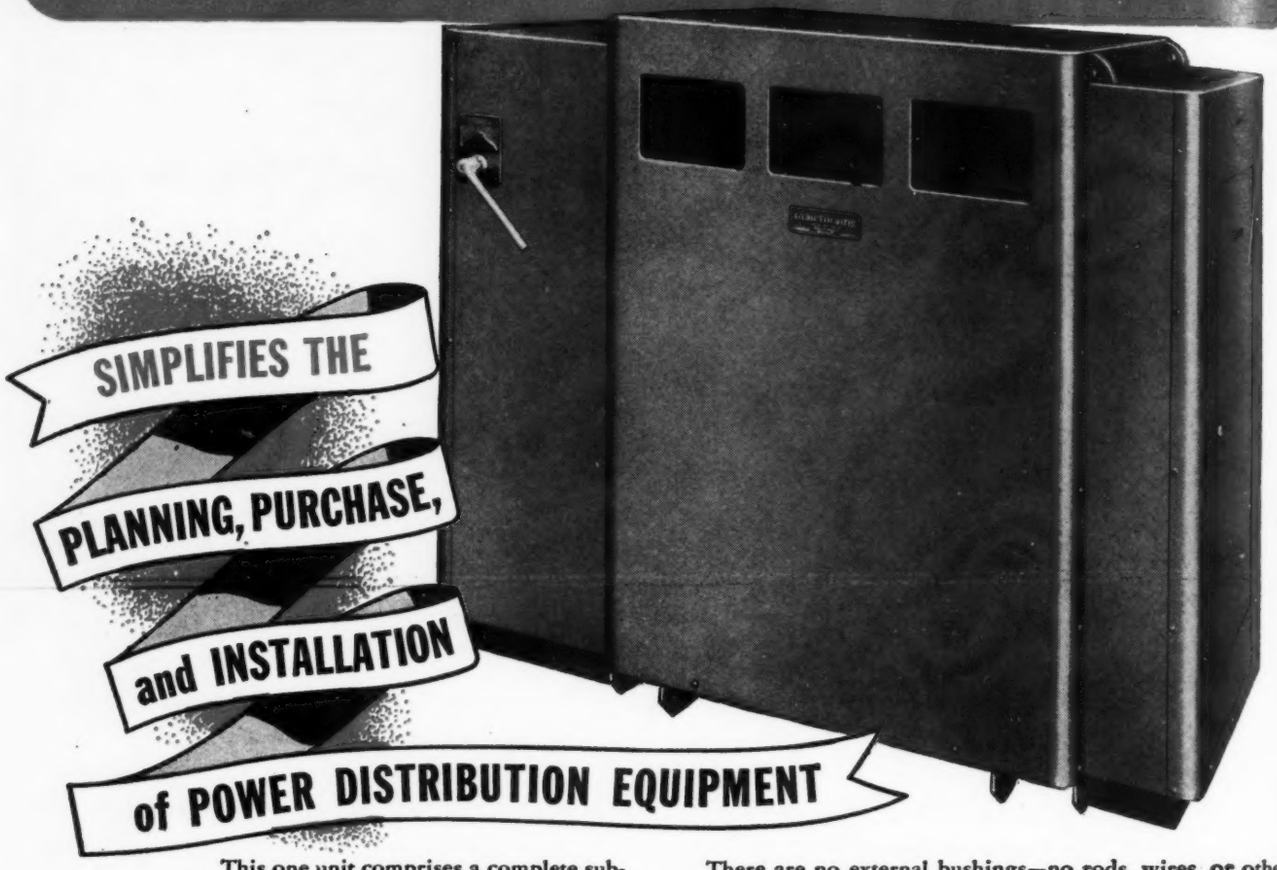
COMPANY.....

ADDRESS.....

CITY.....

(Write here any special ventilating problem you may have).

Wagner "ALL-IN-ONE"
The Modern UNIT SUBSTATION



This one unit comprises a complete substation with air-cooled transformer, H. V. disconnect switch and L. V. circuit breakers—all compactly arranged in an attractive steel cabinet.

Engineered as a single unit, ready to connect to the line, this modern substation provides several important money-saving advantages in the distribution of electric power in factories, office buildings, hospitals, department stores, schools, etc. You save on first cost because no extra engineering and less labor costs are involved. You save on installation cost because the ALL-IN-ONE substation is delivered as a complete, easy-to-handle unit, ready to connect to the line. Neither fire-proof vault nor safety fence is required. You save on maintenance as there is no insulating liquid to test, filter, or change. Panels can be easily removed for quick inspection.

There are no external bushings—no rods, wires, or other exposed live parts to offer a safety hazard. This indoor unit assembly makes a neat, attractive installation anywhere. It can be placed at load centers to shorten low-voltage feeder lines, thus effecting a substantial saving of copper, and at the same time improving voltage regulation of lighting and power circuits.

The ALL-IN-ONE substation is furnished in sizes 100 to 300 kva, 60 cycles, with several combinations of H. V. and L. V. ratings. For sizes above 300 kva Wagner Multumite Unit Substations offer substantially the same money-saving, time-saving advantages as the smaller ALL-IN-ONE substations.

For more information on Wagner ALL-IN-ONE substations and Wagner Multumite unit substations write today, addressing your request to Wagner Electric Corporation, 6412 Plymouth Avenue, St. Louis 14, Missouri. T46-24

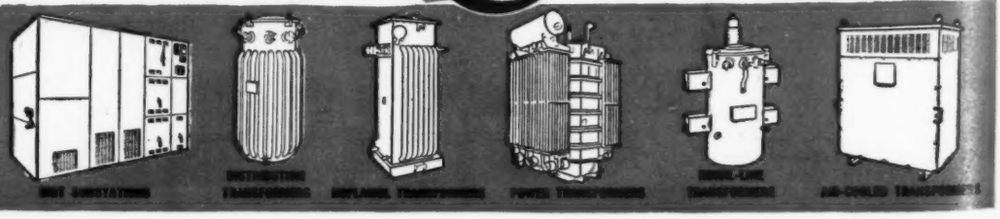
Consult Wagner Engineers on all Transformer Problems

Sales and Service Branches:
Atlanta 3 • Baltimore 18 Boston 15 • Buffalo 8 • Chicago 16 • Cincinnati 10 Cleveland 15 • Dallas 1 Denver 2 • Detroit 2 • Houston 2 • Indianapolis 4 Kansas City 8 • Los Angeles 15 • Memphis 3 • Milwaukee 2 • Minneapolis 4 • New York 7 • Omaha 2 • Philadelphia 8 • Pittsburgh 13 Portland 9 • St. Louis 3 • Salt Lake City 1 • San Francisco 3 Seattle 4 • Syracuse 2 • Tulsa 3 • Washington D. C. 5
In Canada: Wagner Electric at Leaside, Ontario

Wagner WE **Electric**

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID...NoRoL...CoMaX BRAKE LINING

AIR BRAKES...TACHOGRAPHS...INDUSTRIAL BRAKES...ELECTRIC MOTORS...TRANSFORMERS



In Aluminum Paints...

THE VEHICLE MAKES THE DIFFERENCE!

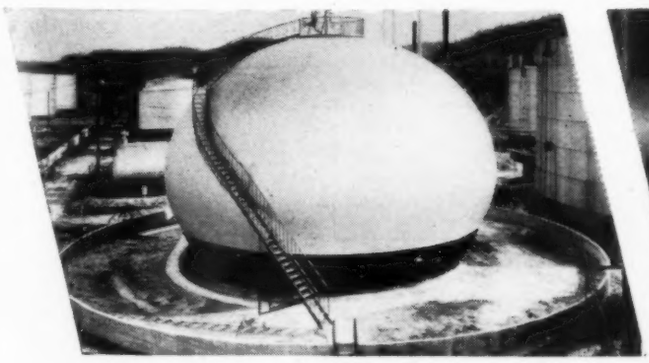
In PERMITE it means...

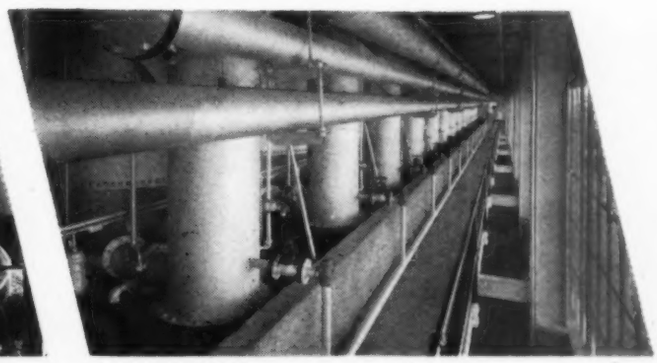
Better Leafing • Greater Brilliance • Extra Durability • Economy

PERMITE ready-mixed, ready-to-use aluminum paints give all surfaces, inside and out, more enduring protection against corrosion and other destructive elements . . . because Permite Paints contain an exclusive, scientifically balanced vehicle of synthetic resins and specially processed oils — blended with 99+% pure aluminum pigment.

Users in every industry have learned to depend upon Permite Aluminum Paint for the better multiple leafing that gives long lasting, high brilliance to their plant structures and equipment. For no other paint has the Permite vehicle! Permite's durability, plus its ready-mixed time-saving form, insures true painting economy. Use Permite for lower maintenance costs. See your Distributor or write us direct.

"Paint Bright with PERMITE"

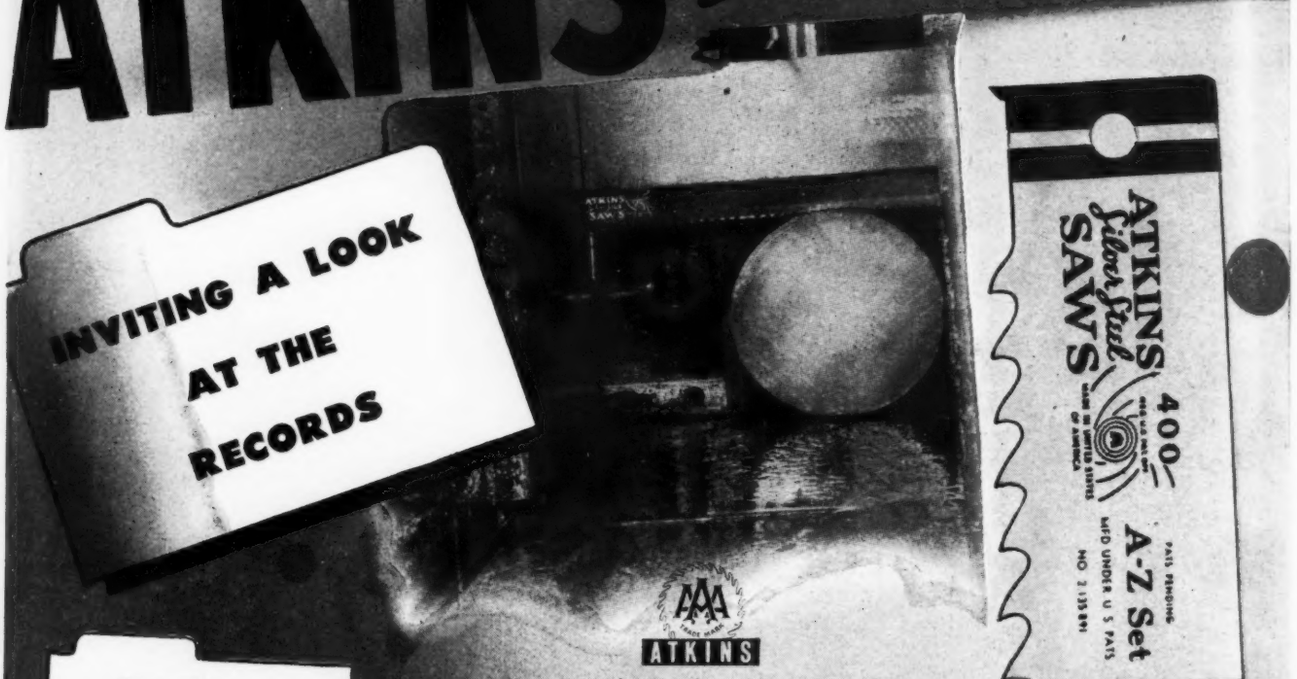




ALUMINUM INDUSTRIES, Inc., CINCINNATI 25, OHIO *Distributors in Principal Cities*

PERMITE READY MIXED ALUMINUM PAINTS

ATKINS *Silver Steel* BLADES



INVITING A LOOK AT THE RECORDS

53% INCREASE

Reduced cutting time from 13 minutes to 8½ minutes — material, 6" No. 94100 (Equivalent to Temken No. 5200).

219% INCREASE

Cutting 4" x 3" Tungsten Tool Steel—an Atkins 1018-P cut in 6 minutes 10 seconds, against best previous of 19 minutes 40 seconds.

131% INCREASE

An Atkins No. 400-18" reduced the sawing time of one-half hour cutting 6" nickel steel bar to only 13 minutes.

43% INCREASE

An Atkins No. 618 Sawing 5" steel castings cut the time to 7 minutes from previous 10 minutes.

110% INCREASE

A No. 400 set a record of 3 minutes and 20 seconds sawing 1020—4" rounds against 7 minutes.

ATKINS

Here's solid proof—from just a few of many such reports on record—that Atkins "Silver Steel" Blades are effective aids in combatting today's rising production costs. Blades that roll up records like those shown here can bring similar savings to your metal cutting operations—can increase the cuts per shift and per blade . . . can decrease downtime and necessary re-machining. But seeing is believing, and an Atkins Engineer is ready to give an actual demonstration—in your plant, on material of your choosing—of superior cutting that is cost-cutting too. Write for details today.

SUGGESTIONS TO USERS

Atkins "Silver Steel" Hacksaw Blades will perform with entire satisfaction, when used in connection with any tensioning device now on the market.

See Your Industrial Supply Distributor or Write To:

E. C. ATKINS AND COMPANY

HOME OFFICE AND FACTORY:
402 South Illinois Street, Indianapolis 9, Indiana
BRANCH FACTORY: Portland, Oregon
BRANCH OFFICES:
Atlanta • Chicago • Memphis • New Orleans • New York • San Francisco

ATKINS BLADES TAKE THE "HACK" OUT OF HACKSAWING

The factory that looked like sad people!
by Mr. Friendly

One day Bill Bones looked at his plant and suddenly noticed it was made of people.
He said, Hello plant. How are you today? And the plant said, Terrible!
We're dreading! they said, Listen to us dread . . . Dread, dread, dread.
And what are you dreading? said
Bill Bones who liked to be in on things.
We're dreading accidents, getting hurt, losing pay, losing skills.
As they spoke, the factory began to sag . . . production sagged
and morale sank right down to the basement.
At that moment (surprising as it may seem!) Mr. Friendly, the
American Mutual man appeared.
He took the plant's pulse, and said,
Hmm . . . Then he wrote a
prescription and handed
it to Bill Bones.

It said, Get special new I. E. LOSS CONTROL!*
It's the best pick-up a sagging plant ever had . . . guaranteed to cure worker worries, low
production. And it's a regular part of American Mutual Service—no extra charge.
Well sir, Bill Bones took out a policy then and there. And when the plant heard the news, it sat up, cheered and leaped with joy.
That's the first time, said Bill Bones happily, I've ever seen a factory start to fly!

The biggest extra in business insurance!

It's American Mutual's I. E. LOSS CONTROL *service.* Helps reduce manufacturing costs . . . Boosts profits and worker morale. Send for information today! American Mutual Liability Insurance Co., Dept. F-3, 142 Berkeley St., Boston 16, Mass.

**Accident prevention based on principles of industrial engineering.*

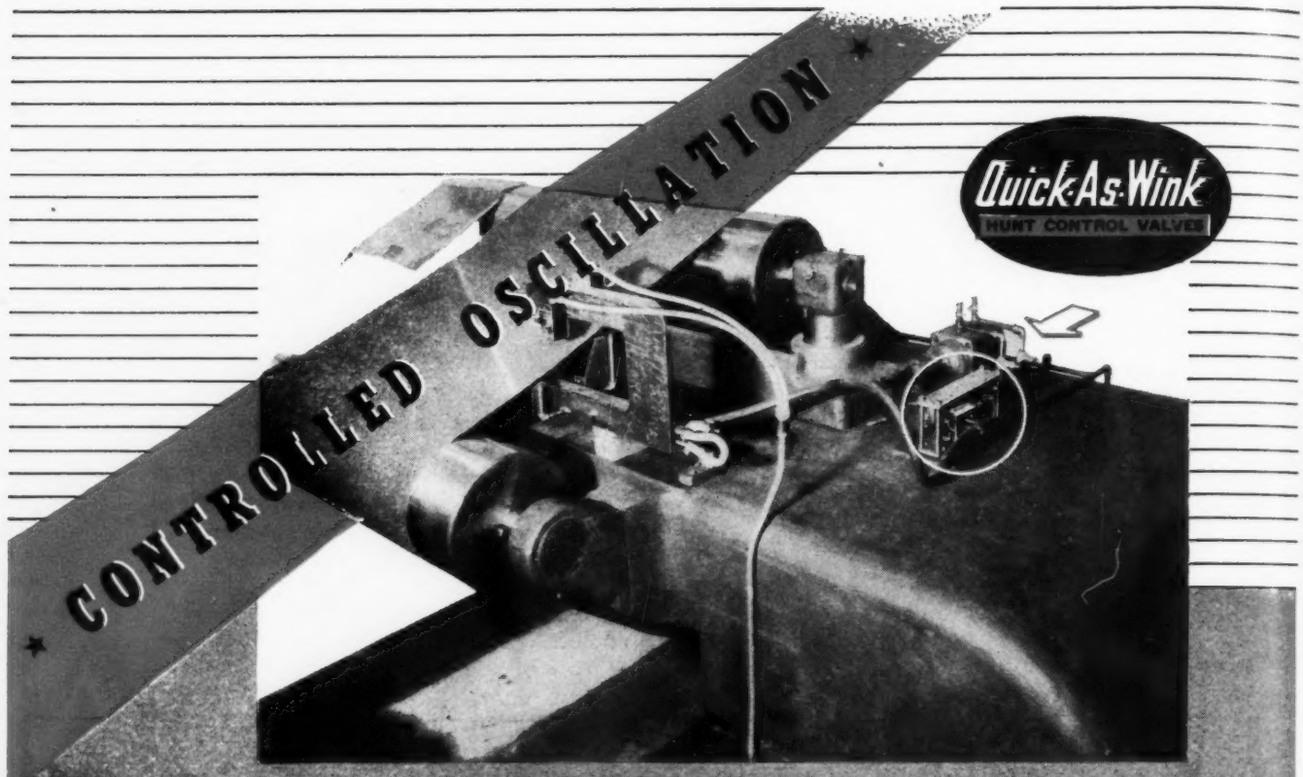
A M

Your helping hand when trouble comes!

AMERICAN MUTUAL

The first American liability insurance company

COPR. 1946, AMERICAN MUTUAL LIABILITY INSURANCE COMPANY



This wide-belt Sheet Grinding and Polishing Machine, a product of Mattison Machine Works, Rockford, Ill., is designed for proper application of factory-coated abrasive belts to the grinding of stainless steel and alloy sheets.

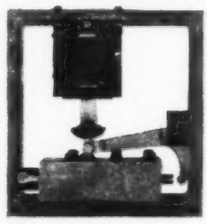
Mattison Wide Belt Machine Imparts Proper Finish To Stainless Steel Sheets

Two Quick-As-Wink solenoid valves are used on this wide belt sheet grinding and polishing machine, a product of Mattison Machine Works, Rockford, Illinois. A 4-way double solenoid-controlled Quick-As-Wink valve controls the belt oscillation by operating an air cylinder which swivels the top idler roll. Photo cells, which actuate the air valve, control travel of the oscillation.

A 2-way solenoid-operated automatic Quick-As-Wink return valve works in conjunction with the controlled air pressure. By means of this second Quick-As-Wink valve, the air pressure is released momentarily at the table reversal, reducing the grinding pressure of the sheet.

Quick-As-Wink valves are available in solenoid, hand, foot, and diaphragm operated for air, also hand and pilot operated hydraulic types for water or oil applications.

New Quick-As-Wink bulletin available upon request.



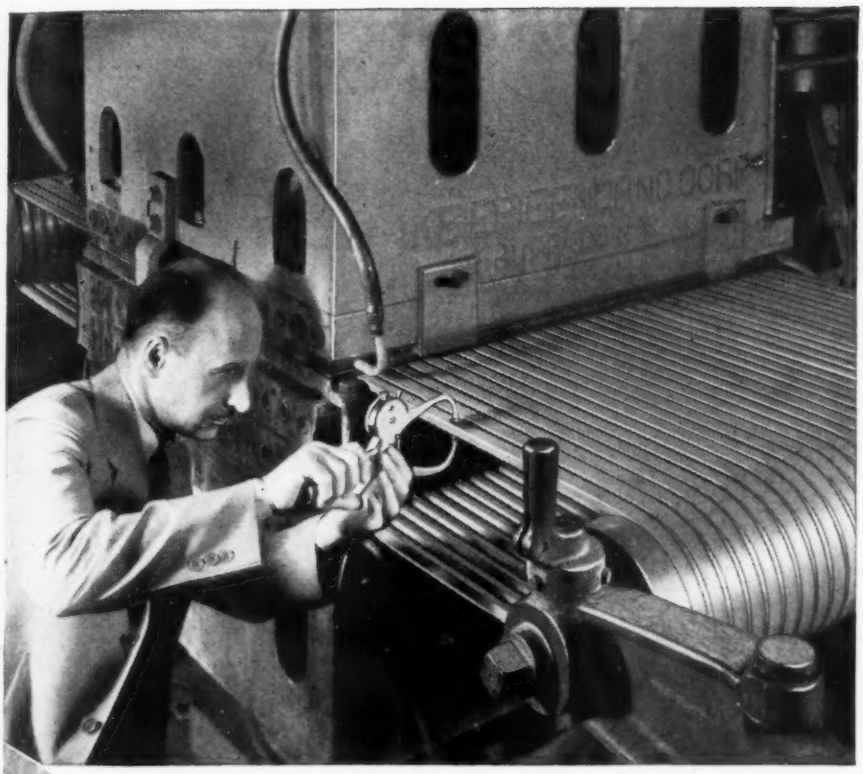
¼" Single Solenoid, Spring Return, 4-way single plunger Quick - As - Wink valve. The valve used on this machine is a double solenoid.

The Single Plunger line of Quick-As-Wink valves has extruded brass or cast bronze housings, depending on the size, ground and polished stainless steel plungers. Solenoid valves are mounted in heavy welded steel frames. All sizes for diversified requirements.

THE HIGHER THE PRESSURE — AIR WATER OIL — THE TIGHTER THE SEAL

C-B-HUNT & SON, INC. SALEM, OHIO

PUTTING ON THE Pressure

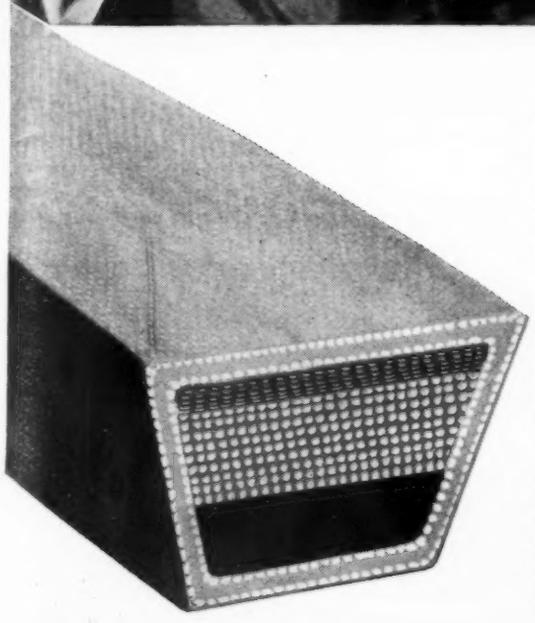


to give you tougher, truer-running TEXROPE V-BELTS

PRECISION curing in these powerful pressure molds gives TEXROPE Super-7 V-Belts their toughness and accuracy of section.

The molds themselves are machined to precision tolerances. Heat, pressure and curing time are accurately controlled. Skilled operators check every step of the process.

This careful curing combines strong, hard-twisted cords, rugged two-ply cover stock and shock-absorbing rubber into BETTER V-BELTS to drive your machines —uniform, long-lasting, smooth-running.



Heat-Resisting Super-7
Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.

Oil-Resisting Super-7
Neoprene cover protects core against moderately oily or greasy conditions.

Oil-Proof Super-7
Made of Neoprene throughout. Use it when the belt must swim in oil.

Static-Resisting Super-7
Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

ONE CALL — FOR ALL V-BELT DRIVE NEEDS

Your nearest Allis-Chalmers office or dealer offers COMPLETE V-Belt Drive service: Super-7 V-Belts in all types and sizes — full range of standard, "Magic-Grip" and Vari-Pitch sheaves — Speed changers — experienced engineering aid by the originators of industry's Multiple V-Belt Drive. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2101

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

TEXROPE V-BELT DRIVES

GAS

supplies

THE PRODUCTIVE FLAMES OF INDUSTRY

for

- core baking
- heat treating
- spheroidizing
- batch melting
- moisture control
- continuous copper brazing
- controlled atmosphere processing
- powder metal sintering

The *productive flames of industry* perform countless other duties. Practically every industrial heating requirement is a logical task for GAS, the versatile fuel, and for modern Gas-fired equipment.

FLEXIBILITY—CONTROLLABILITY—SPEED—UNIFORMITY—ECONOMY; wherever these qualities are required in process-heating, the dependable fuel is GAS. Inherent features of this fuel will suggest many additional industrial applications.

Day by day, successful applications of GAS eliminate production snarls in hundreds of manufacturing plants. Year after year, engineers and production managers specify GAS for increasing numbers of industrial heating installations. More and more the *"Trend is to GAS"* for all industrial heating.

Your local Gas Company solves industrial heating problems every day. Results of these studies will be helpful to you, too. An experienced Industrial Representative will recommend the proper use of GAS for your production process.

MORE AND MORE...

THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

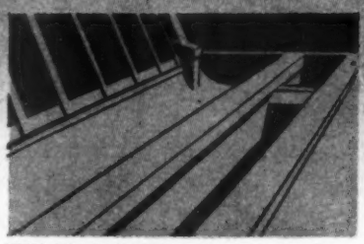
AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

For METAL *or* MASONRY..
...be sure it's HYDRALT*

FOUNDATIONS can be adequately damp-proofed with Hydralt... applied preferably in two coats to a total film thickness of not less than 3 gallons per 100 sq. ft.

STEEL PROTECTION—Even steel that has already begun to corrode can be protected by cleaning and then coating with Hydralt.



STEEL AND CONCRETE need protection from corrosive smoke and fumes. Brush or spray on a protective coating of Hydralt, as in this railroad station smoke slot.

INSULATION MATERIALS, exposed to weather, are protected by fibrated types of Hydralt coatings.

FLINTKOTE'S ALL 'ROUND PROTECTIVE COATING

How many places about your plant require protection against moisture, fumes, smoke and weather?

More of them than you expected, aren't there?

Well, there's *one* type of coating that will protect them *all*. Flintkote HYDRALT. It will pay you to remember that name... and remember what it means.

Hydralt is Flintkote's registered designation for asphalt in its most modern form... a stable, mineral-colloid emulsion.

What does this mean to you? Plenty. It means that *Hydralt* will not soften and flow under heat. It will not crack, craze or alligator under exposure. These are acknowledged advantages for Hydralt over cutback asphalts or hot asphalt coatings.

You can apply Hydralt *cold*, with brush or spray. Or even trowel it on. It's odorless and non-toxic. Easy, economical to use.

And *Hydralt* is *durable*. Extensive tests show that it will far outlast any other form of bituminous coating exposed to weather.

A new folder gives full details about Flintkote's *Hydralt* Protective Coatings. Mail the coupon today for your free copy.

*Reg. U. S. Pat. Off.

THE FLINTKOTE COMPANY, *Industrial Products Division*
30 Rockefeller Plaza, New York 20, N. Y.

Please send me your folder on Hydralt Protective Coatings.

Name.....

Address.....*City*.....*State*.....

FMM-126

Flintkote-Products for Industry

THE FLINTKOTE COMPANY · INDUSTRIAL PRODUCTS DIVISION
Atlanta · Boston · Chicago Heights · Detroit · Houston

FLINTKOTE INDUSTRIAL PRODUCTS

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Los Angeles · New Orleans · Washington · Toronto · Montreal

One Source for Everything in Process Piping Equipment

What a soap plant can do can be done in any process industry to step up piping efficiency the easy way.

By looking to Crane for all piping materials, you get the maximum benefits of standardization practices. Specifying and buying are simplified. Every piping procedure is easier—from design to erection to maintenance work.

With top quality assured by Crane Co.'s 90-year leadership in the field, standardizing on Crane equipment gives you this 3-way advantage:

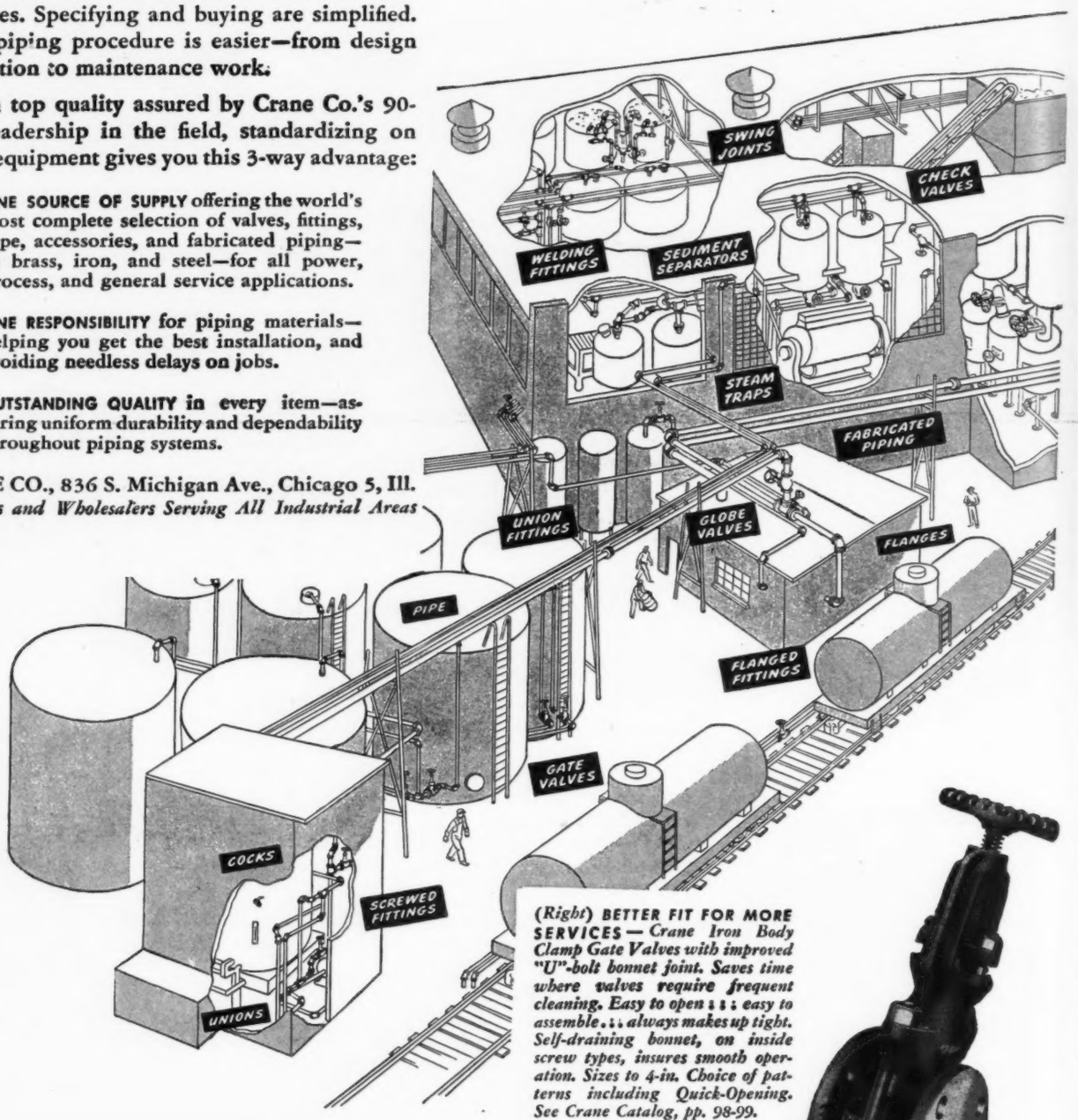
ONE SOURCE OF SUPPLY offering the world's most complete selection of valves, fittings, pipe, accessories, and fabricated piping—in brass, iron, and steel—for all power, process, and general service applications.

ONE RESPONSIBILITY for piping materials—helping you get the best installation, and avoiding needless delays on jobs.

OUTSTANDING QUALITY in every item—assuring uniform durability and dependability throughout piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY



(Right) **BETTER FIT FOR MORE SERVICES**— *Crane Iron Body Clamp Gate Valves with improved "U"-bolt bonnet joint. Saves time where valves require frequent cleaning. Easy to open . . . easy to assemble . . . always makes up tight. Self-draining bonnet, on inside screw types, insures smooth operation. Sizes to 4-in. Choice of patterns including Quick-Opening. See Crane Catalog, pp. 98-99.*

EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
HEATING • PUMPS

CRANE

FOR EVERY PIPING SYSTEM

NEW! WESTON Mutual Conductance Tubechecker and Circuit Analyzer

MODEL 798—TYPE 3

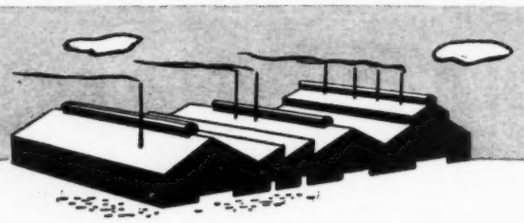
Outstanding Features

- ✓ Direct-reading mutual conductance tests, and "Good-Bad" indications.
- ✓ New patented high frequency tube testing circuit.
- ✓ AC-DC volt-ohm-milliampere ranges.
- ✓ Tests 4, 5, 6, 7 prong octal, loctal, miniature, and acorn tubes...spare octal and miniature sockets.
- ✓ Hot neon leakage test between any two tube elements . . . neon short check.
- ✓ Adjustable plate, screen, grid bias, and signal voltages.
- ✓ Flexibility in switching simplifies testing present and future tubes.
- ✓ Durable heavy-gauge, light-weight alumium case.

Model 798 combines broad utility, ruggedness, and dependable accuracy for maintenance of sound and electronic equipment. Detailed bulletin available. Weston Electrical Instrument Corporation, 582 Frelinghuysen Avenue, Newark 5, New Jersey.

Weston Instruments

ALBANY • ATLANTA • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • JACKSONVILLE • KNOXVILLE • LOS ANGELES • MERIDEN • MINNEAPOLIS • NEWARK
NEW ORLEANS • NEW YORK • PHILADELPHIA • PHOENIX • PITTSBURGH • ROCHESTER • SAN FRANCISCO • SEATTLE • ST LOUIS • SYRACUSE • IN CANADA, NORTHERN ELECTRIC CO., LTD., POWERLITE DEVICES, LTD.



Ventilation and Production

There is a vital relationship in your plant between ventilation and production—no matter what your product may be. This is too often ignored or underestimated. Improper ventilation—or lack of ventilation—of your buildings can be very costly in slowing down production and impairing the quality of your product; while *proper* ventilation can lower your costs while stepping up production and maintaining highest quality standards. Where excessive heat, smoke, and fumes are present they must be exhausted from your building *quickly and efficiently*—without "lag"—but building comfort in cold weather should not be impaired.

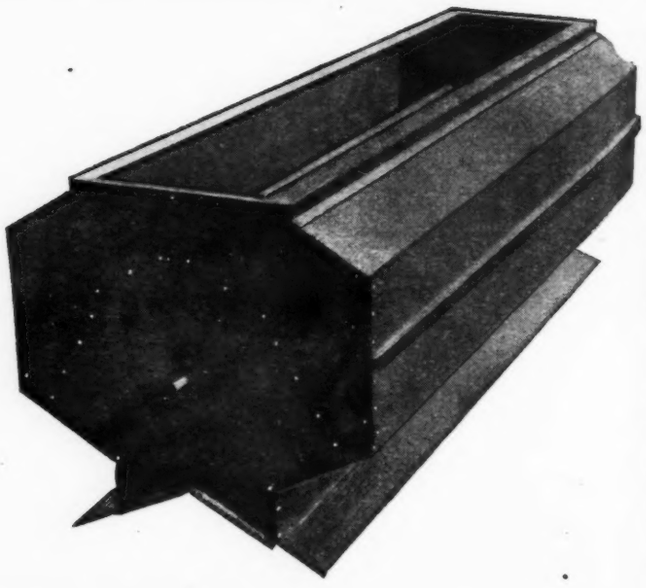
That is why it is to your advantage to have the expert advice of experienced engineers in determining the solution to your ventilation problems; and also why the latest design Industrial Ventilator will prove most advantageous and economical for your buildings.

Plasteel Air Controls combine the advantages of past designs with unique exclusive features heretofore unavailable. They "do the job"—when, where, and as you want it done. There is a design for each specific purpose. Plasteel Engineers are available to apply a wealth of past experience and unusual knowledge of building air movements to your problems. Write, wire, or phone today.

PLASTEEL AIR CONTROLS

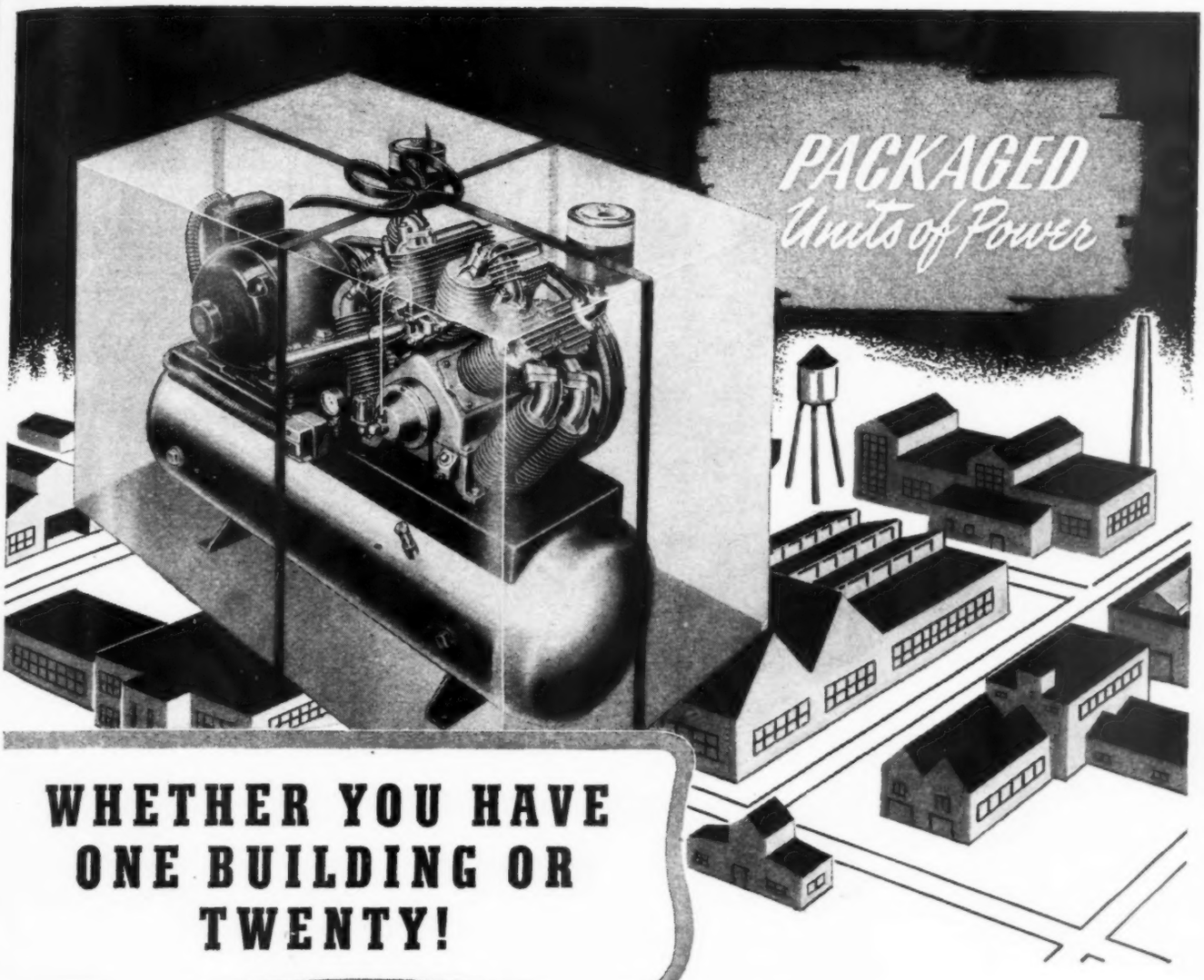
Ridge Ventilator

The modern design with exclusive features. Provides highest efficiency with utmost economy. Contains no exhaust retarding braces, baffles, or other framework. Air flow is streamlined and full exhaust is obtained regardless of weather conditions. May be dampered partially or fully with slight pull of damper chain and opened likewise. Made of Plasteel—it's permanent—never needs painting, and it is extremely easy to erect on any type building. Made in sizes to 30 inch throat—other designs to 72 inch throat. Let us show you its exclusive features.



PROTECTED STEEL PRODUCTS

General Office and Plant • Washington, Pennsylvania



WHETHER YOU HAVE ONE BUILDING OR TWENTY!

Wayne Auxiliary Compressors

WILL SUPPLY COMPRESSED AIR TO ALL

No PIPE line extensions are needed and there are no capacity limitations in supplying air to added buildings when you use Wayne Auxiliary Air Compressors to augment or replace your large central air system. Even if buildings are far from your main plant, simply add Wayne Compressors for each department needing air. Completely packaged, easy to install and easy to move. Write for booklet "The Wayne Auxiliary Unit Plan" today.

for your protection

Industrial Division

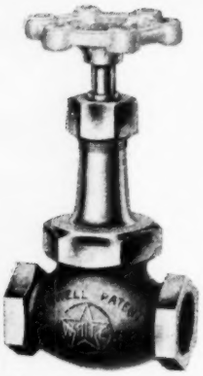
THE WAYNE PUMP COMPANY • FORT WAYNE 4, INDIANA

INDUSTRIAL AIR COMPRESSORS

LIFTS • HOSE REELS • POWER WASHERS • BULK GASOLINE PUMPS

POWELL has the *right* Valves for *all* your Flow Control requirements!

Large 125-pound Iron Body Bronze Mounted O. S. & Y. Gate Valve.



200-pound Bronze Globe Valve with regrindable, renewable wear-resisting seat and disc.

This may sound like a broad statement—but we can back it up. Because, through 100 years of making valves—and valves only—Powell has always been ready with valves that are *right*—in both design and material—to meet *all* demands imposed by the amazing growth of American Industry.

Today the Powell Line includes Bronze and Iron Valves of every necessary type, size, design and working pressure; Cast Steel Valves of every type in pressure classes from 150 to 2500 pounds; and a complete line of Corrosion-Resistant Valves, including many special designs and made in the widest range of pure metals and special alloys ever used in making valves.

200-pound Bronze Gate Valve with union bonnet and renewable "Powellium" disc.

The Wm. Powell Co., Cincinnati 22, Ohio

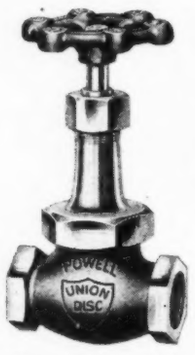
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

Catalogs on request. Kindly state whether you are chiefly interested in Bronze, Iron, Cast Steel, or Corrosion-Resistant Valves.

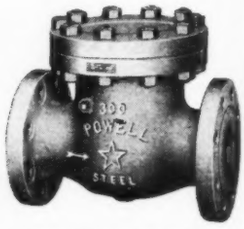
Large 250-pound Iron Body Bronze Mounted Regrinding Horizontal Swing Check Valve.

150-pound Bronze Gate Valve with screwed-in bonnet and inside screw, non-rising stem.

200-pound Bronze Regrinding Horizontal Swing Check Valve.



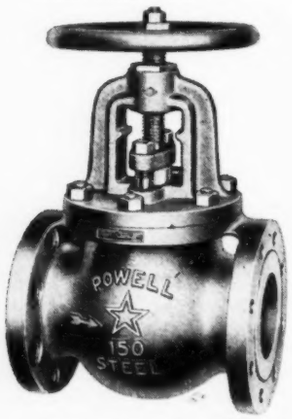
150-pound Bronze Globe Valve with renewable, composition disc.



Class 300-pound Cast Steel Swing Check Valve.

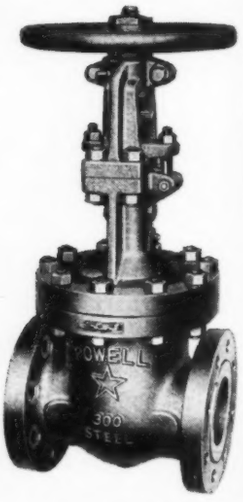
Large 125-pound Iron Body Bronze Mounted O. S. & Y. Globe Valve.

125-pound Iron Body Bronze Mounted "Master Pilot" Gate Valve.



Class 150-pound Cast Steel O. S. & Y. Globe Valve.

125-pound Bronze Gate Valve with screwed-in bonnet.



Class 300-pound Cast Steel O. S. & Y. Gate Valve.

POWELL VALVES

"Steelply

REINFORCED—

TRANSMISSION BELTS FOR "BELT KILLERS"

A NEW ERA IN POWER TRANSMISSION began with the development of *steel-cable* reinforced belts for heavy-duty drives. Such "Belt Killers" as crushers, compressors, lumber "hogs," or band-wheel power will meet their match in this new belt.

Roebling multiple strand "Steelply" cables, built into the body of the belt, make possible much greater initial tensions. Stretch and creepage are reduced to virtually nothing . . . horsepower practically doubled.

Far more flexible than fabric-bodied belts, their performance is unapproached by any conventional belts. They will handle the heaviest loads efficiently and economically.

In planning new drives or in ordering replacements, be sure to ask your supplier about these new steel-cable reinforced belts.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

"Steelply CORE

Roebling "Steelply" cables, forming the body of the belt, carry the load. Scientifically designed to insure true running, the cable core is extremely flexible.

FABRIC and RUBBER

Heavy-duty, rubber-impregnated duck protects the cables, provides the necessary "cushion" between the cables and the surface of the pulley or sheave.

The Strength of Steel PLUS *The Resilience of Rubber*

ROEBLING

PACEMAKER IN WIRE PRODUCTS

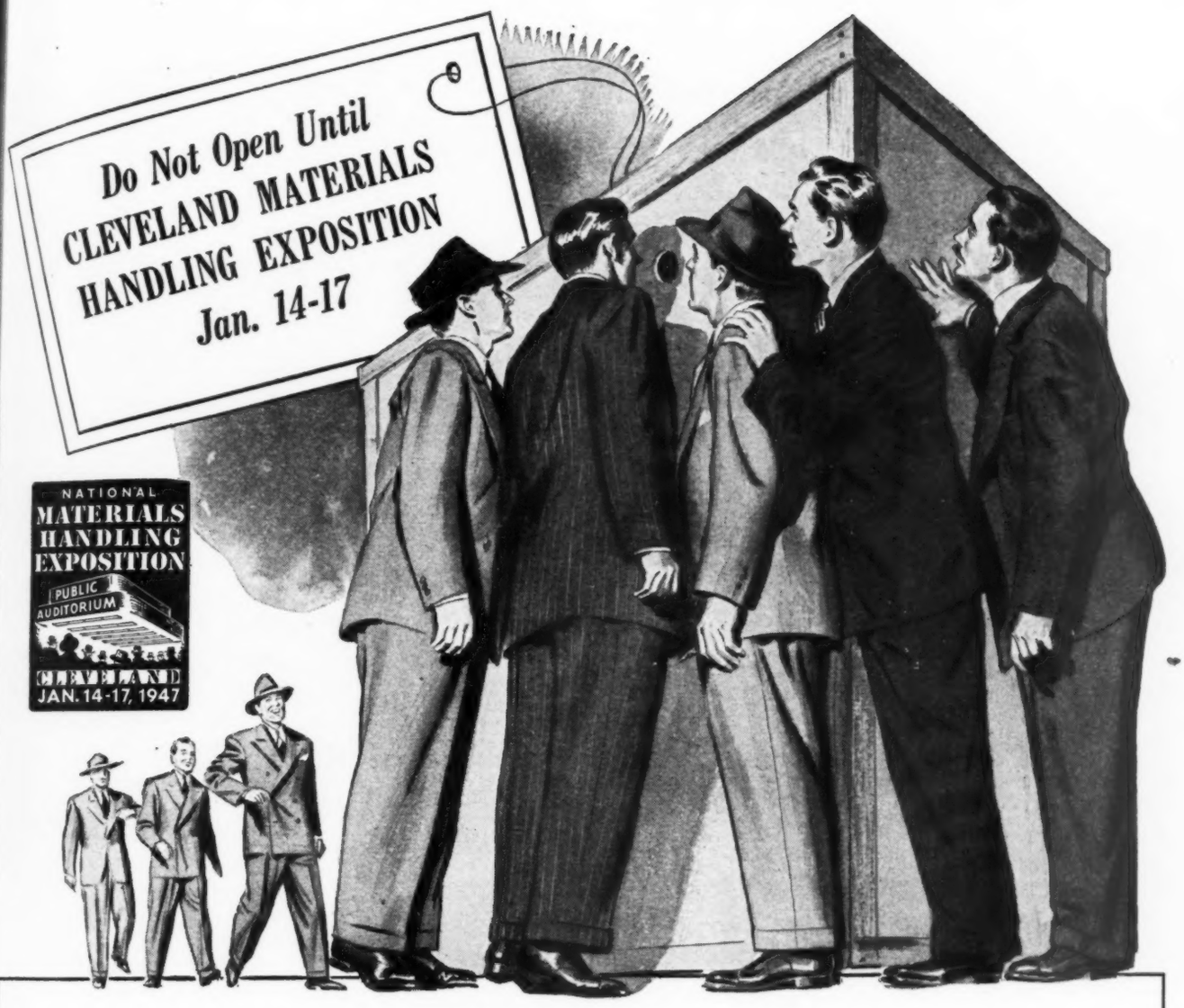
Interchangeable Control Units

From this complete line of Control Units (black Bakelite sections) you can assemble any arrangement of Push Button Stations, Pilot Lights or Selector Switches, from simple remote controls to practically any combination required. Push buttons, transfer switches and pilot lights are interchangeable and adaptable to any regular or special combination . . . Standard housings may be had in steel, cast, weatherproof, flush with brass plate and box, or in separate units.

As indicated above, *complete* Control Units may be ordered by Catalog number for commonly standard requirements. For all others, the control units, bulls-eyes, labels, covers and housings are ordered separately by Catalog number to make up the assembly needed. Units without housings or special panels may be grouped to fit any condition of installation or control . . .

Motor Starting Switch Catalog 9-M — on request — lists the complete line; our engineers will gladly cooperate in laying out control diagrams.

INDUSTRIAL CONTROL DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN., U. S. A.



Automatic Unveils for the First Time
Advanced 1947 Models

Management particularly will be interested in these new materials handling developments that cut handling costs way down.

They are products of intensive research—outstanding engineering contributions—provide all of the features industry most wanted, for ease, economy, safety and efficiency in materials handling.

Transporter
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

See these new Automatic products unveiled at the National Materials Handling Exposition at Cleveland, BOOTH . . . 506.

Automatic
ELECTRIC TRUCKS
Lighten LIFE'S LOADS

LOOK TO THE LEADER FOR ALL THAT'S NEW

GREATER PRODUCTION EFFICIENCY—

WHATEVER YOU MAKE

TEXACO Lubricants and Specialized Lubrication Engineering Service are helping management get greater production efficiency in plants of every size and type all over the country. *Texaco* can help increase production, reduce rejects and lower unit costs in *your* plant, too—whatever you make.

Texaco Cutting and Soluble Oils, for example, assure faster, finer machining, longer tool life and less down time — whatever the metal or the machining method.

Texaco Regal Oils (R & O) keep hydraulic units operating efficiently and economically — prevent formation of the sludge and rust which cause costly, time-consuming stoppages.

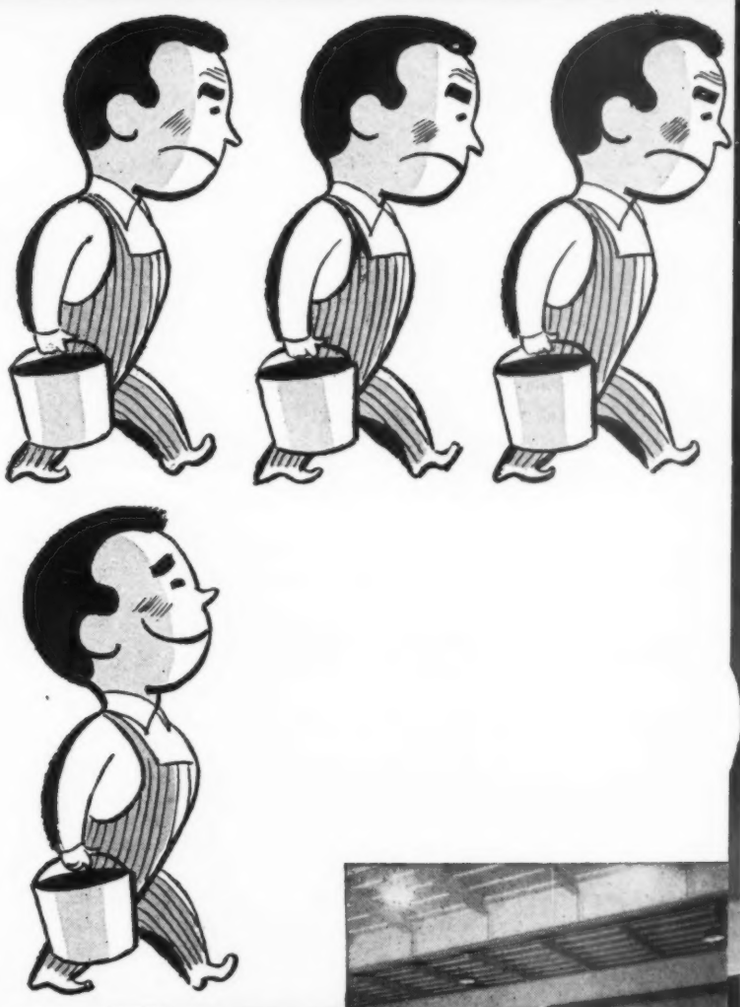
Texaco Regal Starfak prolongs the life of ball and roller bearings, reduces repairs and replacements, cuts maintenance costs — in fact, exceeds every test requirement for an ideal anti-friction bearing lubricant.

You can assure these and other cost-saving benefits in *your* plant by calling the nearest of the more than 2300 Texaco distributing plants in the 48 States, or writing The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO Lubricants, Fuels and Lubrication Engineering Service

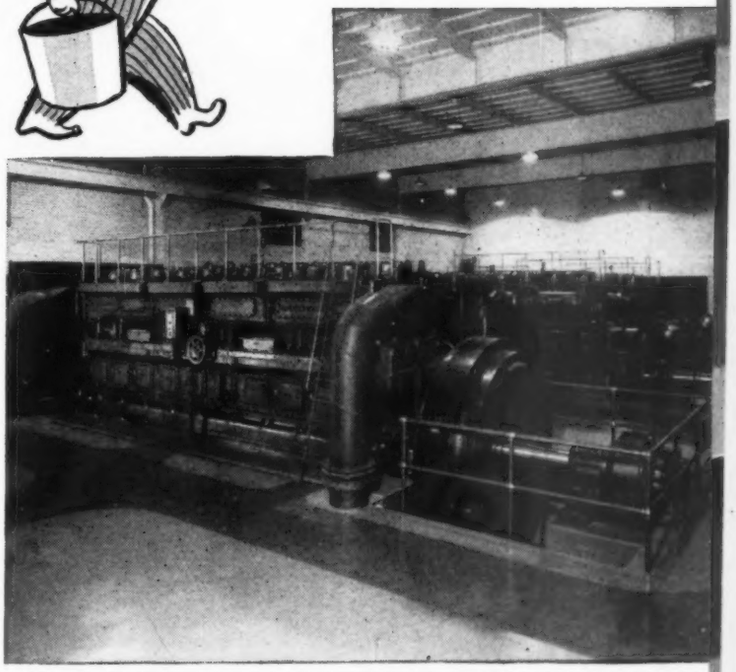
Tune in...TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. Metropolitan Opera broadcasts every Saturday afternoon.

From 3 buckets of port carbon a week to just one



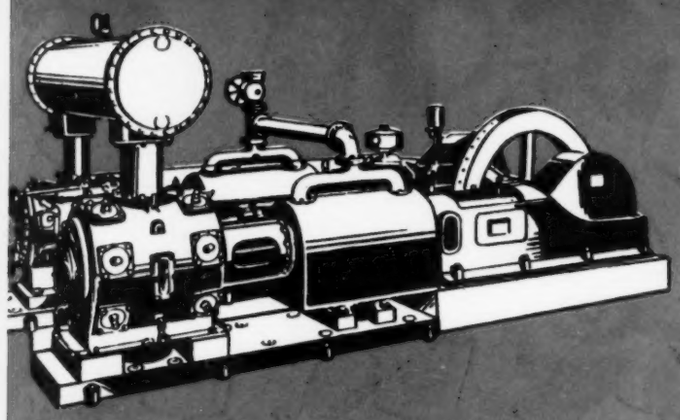
BEFORE this Illinois Municipal power plant operated on Nonpareil HD Diesel Oil, the three Diesels—one 850 H.P. and two 1,050 H.P. engines—were cleaned of port carbon weekly. Three 12-quart buckets of carbon were removed at each cleaning. When the 2,000 H.P. engine in the foreground was installed Nonpareil HD Diesel Oil was used. One of the immediately noticeable results was the comparative freedom from port carbon deposits on this new Diesel. Within a year the three older engines were put on Nonpareil HD. Then there was no doubt. Port carbon dropped to one-third—less than one bucket of carbon a week for all three engines.

Minimizing of port carbon is just one of Nonpareil HD's maintenance saving advantages which operators *have proved for themselves* in hundreds of similar installations. What is your Diesel lubricating problem? There's a Standard Oil Lubrication Engineer ready to help you solve it if your plant is located in the Midwest. Just write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

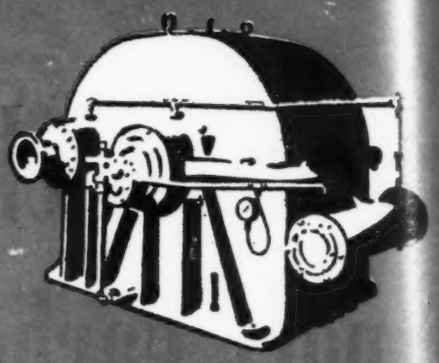


NONPAREIL HD DIESEL OIL

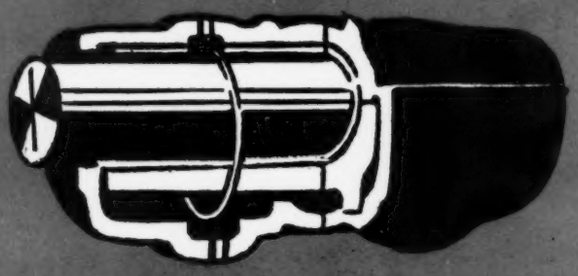
STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE



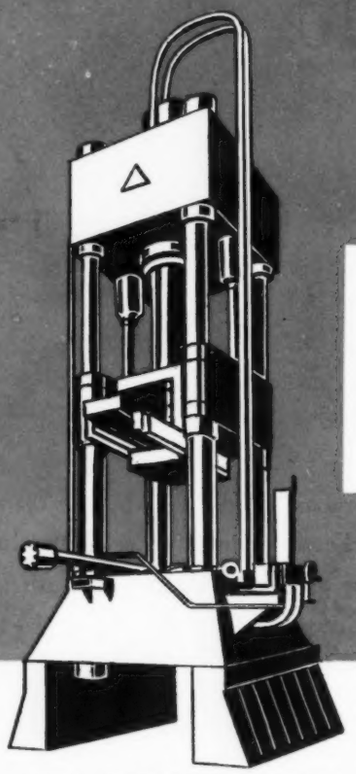
Less deposits in compressors because the improved oxidation stability of Stanoil resists heat . . . the low carbon forming base oil in Stanoil helps keep valves free from carbon.



Fewer oil changes in gear cases because the inhibitor in Stanoil prevents excessive acidity and deposit formation over long periods of operation.



Low bearing wear because of Stanoil's high lubricating quality and because its high viscosity index assures a free flow of the lubricant at starting, and resistance to thinning out as temperatures increase during operation.



Reliable hydraulic system operation because Stanoil contains an anti-foaming additive which prevents erratic operation caused by air entrained in the oil.

You get all these advantages in one oil . . . STANOIL

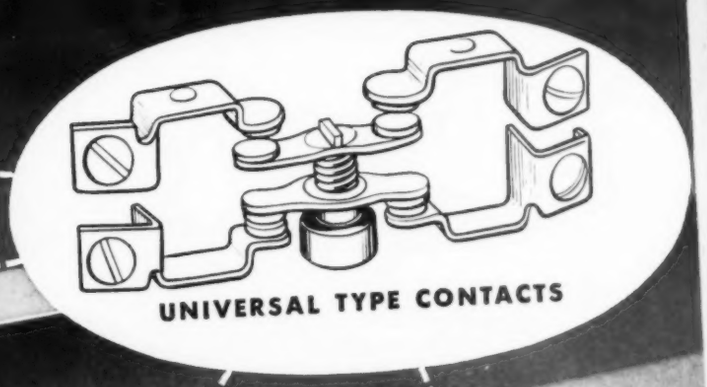
For further advantages of Stanoil in many applications in your plant see a Standard Oil Lubrication Engineer.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Here are 4 Relays that Equal 18

. . . they will satisfy any industrial requirement



UNIVERSAL TYPE CONTACTS

TWO-POLE UNIVERSAL RELAY

FOUR-POLE UNIVERSAL RELAY

SIX-POLE UNIVERSAL RELAY

EIGHT-POLE UNIVERSAL RELAY

You can provide for unexpected design or circuit changes with the new Bulletin 700 Universal Solenoid Relays. These relays are a new idea in relay design—an amazingly simple one. To change from "normally open" to "normally closed" contacts—or vice versa—you merely change the contact connections. A most convenient arrangement for experimental work or tricky control circuits. These relays have the same time-proven construction as all other Bulletin 700 Solenoid Relays. Available in 2, 4, 6, and 8-pole construction. Also furnished as a Bulletin 200 direct current "Universal" relay. Write for information.

A-B Quality

BULLETIN 700 (A. C.)
BULLETIN 200 (D. C.)

ALLEN-BRADLEY

UNIVERSAL SOLENOID RELAYS

QUALITY

Only 1 Moving Part

- DOUBLE BREAK SILVER ALLOY CONTACTS
- NO CONTACT MAINTENANCE
- SIMPLE CONSTRUCTION
- COMPACT
- EASY TO INSTALL

You get these advantages in ALL SIX SIZES of the Allen-Bradley *Solenoid Starter*

With the development of the new Size 5, Bulletin 709 solenoid starter, you can get the recognized benefits of *solenoid* construction—not only in small starters but for applications up to 300 amperes. Because of their inherent simplicity and ruggedness, these solenoid starters are good for millions of trouble-free operations. Write for information.

ALLEN-BRADLEY COMPANY
1316 S. Second Street
Milwaukee 4, Wisconsin

A-B Quality

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

QUALITY

HYSTER

Industrial Trucks do more work...

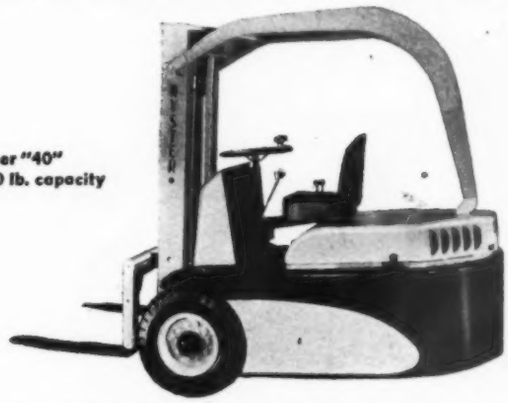
Regardless of your business — a quick and guaranteed method of increasing net profits is to cut materials handling costs by using Hyster industrial lift trucks.

Hysters are materials handling expediters that do an amazing amount of work—*save time and money*—release manpower for more productive jobs in factory, field or warehouse.

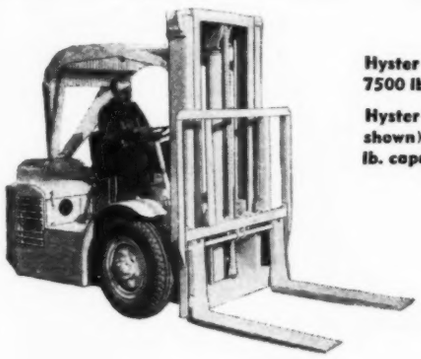
Hyster models range in capacity from 2000 lbs. to 30,000 lbs. All models are *pneumatic tired*, gasoline powered, engineered and built for fast, efficient, enduring service.

Illustrated literature sent gladly.

Hyster "20"
2000 lb. capacity



Hyster "40"
4000 lb. capacity



Hyster "75"
7500 lb. capacity

Hyster "150" (not shown) has 15,000 lb. capacity

Hyster Karry Krane
10,000 lb. capacity
Mobile crane truck with adjustable boom

Hyster Straddle Truck "M"
12,000 lb. capacity
Model "MH" (not shown) has 30,000 lb. capacity

HYSTER COMPANY

2956 N. E. CLACKAMAS ST., PORTLAND 8, OREGON
1856 NORTH ADAMS STREET, PEORIA 1, ILLINOIS

HYSTER

Sold and Serviced Through Distributors in Principal Cities All Over the World

WORLD'S LARGEST MANUFACTURER OF PNEUMATIC TIRE LIFT TRUCKS AND STRADDLE TRUCKS

Accidents happen...

Chen Wai Sze was quiet amidst the babble of voices in the old tea house beside the river.

The merchants were gathered, as was their custom, to exchange the day's news of their boats carrying precious cargo to distant cities.

Gravely old Chen listened as the merchants spoke courteous commiserations to the luckless one whose boat had capsized in the treacherous rapids, whirling to destruction the wealth accumulated through years of labor.

At last Chen spoke. "My honored brothers: the grass by the river bank is green, thick are the willow trees, always hungry are the rapids of the river. And fear of utter loss is constant in our hearts.

"Let us then bring our boats together. Let each of us place in each boat a small portion of his cargo. Thus when a boat must satisfy the maws of the river, each of us will lose a little, but none of us will lose his all."

So it was that the merchants shared the chances of loss on the great river that flows forever to the sea.

How EMPLOYERS MUTUALS of Wausau help you to keep ... forever ... part of all you earn

The difference between income and expenditures is yours to keep—forever—*if you protect it.*

That is the purpose of insurance—to protect the assets of a business or an individual.

If you take a chance that disaster will not strike you or your business, you may save a little. But disaster does strike someone—hour after hour, day after day.

Through Employers Mutuals, more than a hundred thousand policyholders share their chances of loss. Each pays his small share of the total cost; each gains protection against disaster.

What are your chances of loss today?

If you are an employer: one out of every 25 men and women employed this year will be killed or seriously injured in accidents at work.

If you drive, or your employees drive: one out of every 28 motor vehicles will kill or seriously injure a man, woman, or child this year. Hundreds of thousands of drivers will have accidents involving property damage. This damage alone will total over $600,000,000. How much could you afford to pay for one of these accidents?

Wherever you live: there will be a fire in one out of every 100 dwelling places this year, at an average cost of $325.61 per fire.

EMPLOYERS MUTUALS of WAUSAU

.....make Insurance

EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN *Established 1911*

EMPLOYERS MUTUAL FIRE INSURANCE COMPANY *Established 1935*

Strong...Lightweight Partitions with VIMLITE*

A Celanese* Plastic

for
- AIR CONDITIONED ROOMS
- SPECIAL PROCESS ENCLOSURES
- FALSE CEILINGS
- SKYLIGHT GUARDS
- OFFICE AND STOCKROOM PARTITIONS
- RECREATION AREAS
- PORTABLE BUILDINGS
- ROOFTOP PLAY AREAS

Vimlite gives privacy with light . . . no interference with original light sources . . . lightweight—easy to install . . . gives years of service

All-plastic Vimlite is a new Celanese product—made by overcoating tough plastic mesh with transparent plastic. This construction produces thousands of tiny lens-like interstices which collect, diffuse and redistribute light—producing an effect like frosted glass. Bursting strength is 165 lbs. per square inch.

VIMLITE IS EASY TO INSTALL

Simply cut the 36 inch wide roll to length with shears and tack in place under wood strips. Once installed, Vimlite stays put.

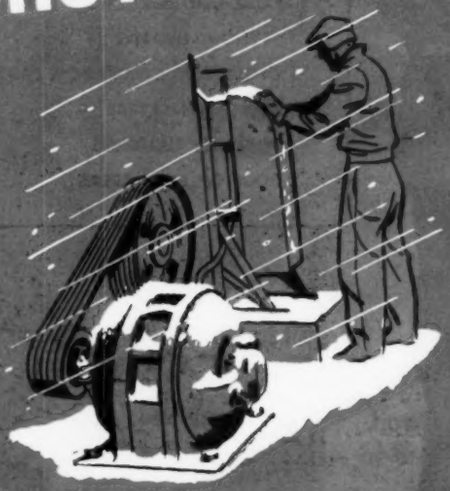
*Reg. U.S. Pat. Off.

AMPLE STOCKS OF VIMLITE ARE AVAILABLE NOW!

Check with your hardware or building material supplier. If he doesn't have plastic mesh Vimlite in stock, send us his name, and we will arrange to have you supplied. Celanese Plastics Corporation, a division of Celanese Corporation of America, 180 Madison Avenue, New York 16, N. Y. Dealers and commercial consumers may obtain full information from Celanese representatives listed in the telephone directories of the following cities: Los Angeles, Chicago, Detroit, Philadelphia, Dallas, Dayton, Cleveland. Leominster, St. Louis, Washington, D. C.

Investigate the Vimlite Window Shade . . . Translucent or Opaque . . . Cleans Easily . . . Practically Permanent

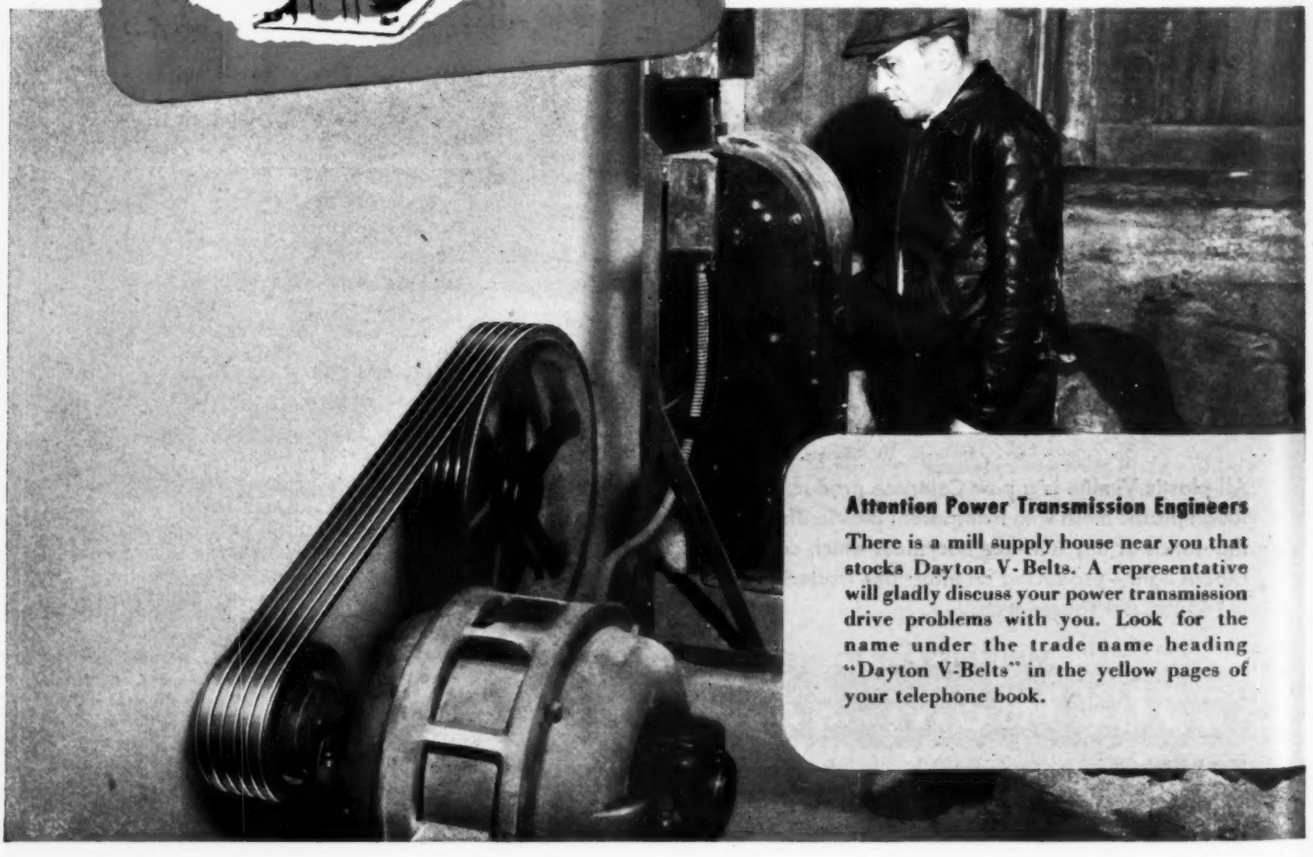
GLASS PLANT ELIMINATES *Costly* SHUTDOWNS



RUGGEDLY BUILT DAYTON V-BELT DRIVES

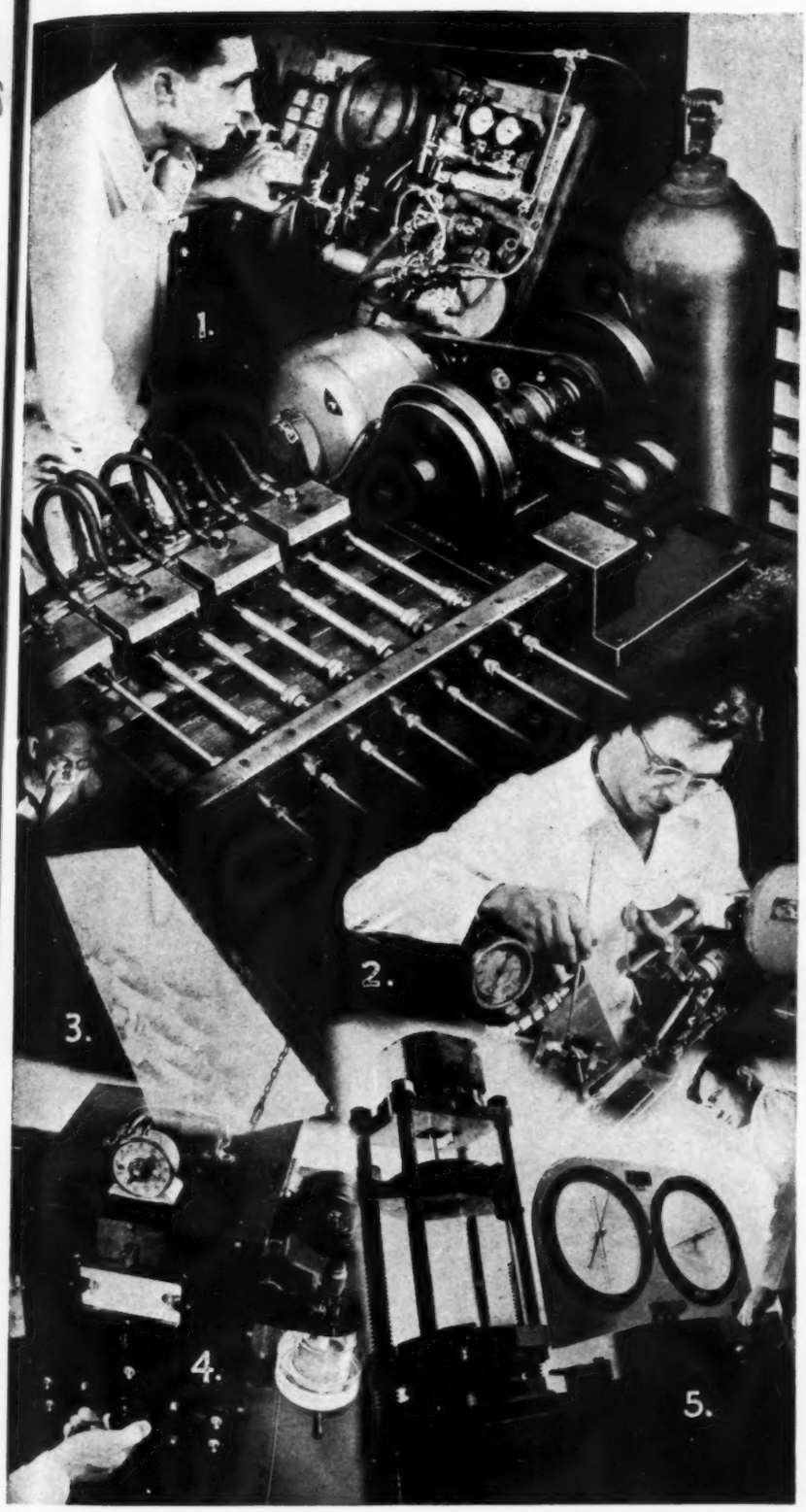
Operate efficiently in snow, rain, heat, cold, dust and dirt

Power drives, located outside, operate the 72-inch fans that cool glass furnaces in the plant of a large manufacturer of commercial and chemical glassware. These drives are subject to rapidly changing weather conditions. Original belts on the drives couldn't take it, broke with disturbing frequency which resulted in improper cooling, causing severe damage to furnaces, damage that was expensive to repair and caused serious interruptions in production schedules. Six years ago Dayton V-Belts were tried on one of the drives. They could, and did, take it! For six years no shut-down has been experienced due to belt failure. Now all fan drives are Dayton V-Belt equipped. Dayton V-Belts can take it because their stronger, more compact Daytex Cords provide extra strength and the especially compounded materials provide high resistance to the toughest operating conditions. They are the result of over 40 years of research and manufacturing experience working with natural and synthetic rubber. It is experience that can help you solve your power transmission drive problems. Write today to The Dayton Rubber Manufacturing Company, Dayton 1, Ohio.



Attention Power Transmission Engineers

There is a mill supply house near you that stocks Dayton V-Belts. A representative will gladly discuss your power transmission drive problems with you. Look for the name under the trade name heading "Dayton V-Belts" in the yellow pages of your telephone book.



MASTERS OF THE "Third Degree"

THE TOUGHER WE ARE on Weatherhead products in the laboratory, the better they will be able to take it in your automobile, refrigerator, mechanical product . . . *any* place where hose, valves, or fittings are used. That is why every Weatherhead product goes through an exhaustive third degree before it is made available to you.

For example, there are those exhaustive vibration tests of fittings shown in Illustration No. 1. The vibrator bar in the middle operates continuously at high speed in an attempt to jar these fittings loose while they carry hydraulic fluid under high pressure.

There are those never-ending cycling tests which literally wear the life out of valves, as is shown in Illustration No. 2. The tiniest failure is made evident by a film of soap which the attendant here is applying to the valve.

Then there is the cold box, as is shown in Illustration No. 3, which subjects valves and fittings to sub-zero temperatures while they carry maximum pressure loads.

All the materials that go into Weatherhead products are carefully tested before they are fabricated into parts. Illustration No. 4 shows an electro analyzer using the process of electrolysis to determine the copper content of a piece of brass.

The tensile testing machine shown in Illustration No. 5 stretches a metal test bar until it reaches the breaking point.

These are only a few of the many tests to which Weatherhead materials and products are subjected. They all undergo the third degree before they receive the Weatherhead seal of approval. That's why Weatherhead products receive the consumers' seal of approval.

Look Ahead with

Weatherhead

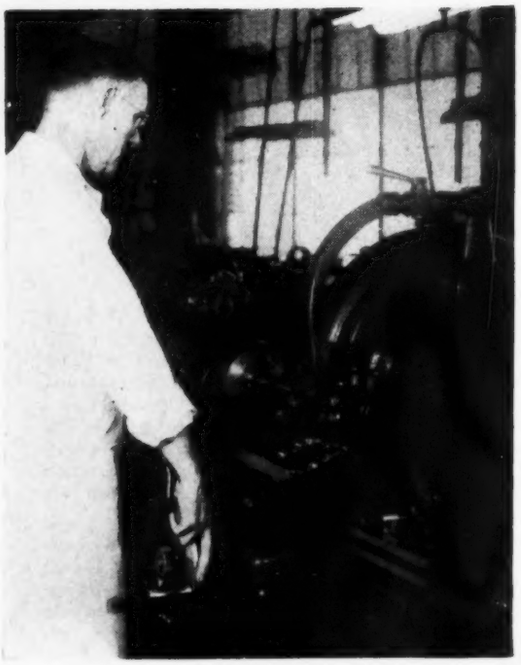
THE WEATHERHEAD COMPANY, CLEVELAND 8, OHIO

NEW YORK • DETROIT • CHICAGO • ST. LOUIS • ATLANTA • DALLAS • LOS ANGELES

WEATHERHEAD PRODUCTS INCLUDE:

Fittings • Cylinders • Drain Cocks • Hose Assemblies • Dash Controls • Packing Regulators • Valves • Dehydrators • Strainers

DALLETT-PNEUMATIC TOOLS



Craftsman Harry R. Friend, a Dallett employee for 22 years, shown grinding Dallett parts to close tolerance on external grinder.

DALLETT has been consistently making fine tools since 1883. Into every item in the Dallett line go only the finest steel and materials available—and the most exacting workmanship. Every step of the manufacturing procedure is double-checked—because the Dallett reputation, so carefully guarded, is built into every tool that bears the Dallett mark.

Dallett Pneumatic Tools are built sturdy and fool proof in a wide choice of models and sizes for specific uses—Built to take punishment and stand up under heavy, uninterrupted use.

Write for Pneumatic Tool Bulletin No. 100

Light Chipping Hammer

Scaling and Cleaning Hammer

Drill for all-around industrial maintenance work

Precision Made

Simplicity in construction, which makes for ease of operation, always has been a Dallett feature. Precision of every part assures perfect performance for a period beyond the operator's expectancy. Many of the craftsmen who make the Dallett line have been in service for twenty years or more.

CHISEL BLANKS AND CHISELS

Dallett Pneumatic Chisel Blanks and Chisels are made in most trade standard shanks . . . Chisels for Chipping Hammers, Scaling Tools and other uses are available in a variety of styles and sizes of cutting edges. Safety Retainer Shank Chisels are carried in stock for most makes of small Pneumatic Tools with Retainer type bushings.

See the classified section of your local telephone directory.

THE DALLETT PRODUCTS:

Pneumatic Chipping Hammers

Scaling Hammers

Maintenance Hammers

Pneumatic Stone Drills

Wood Carving Tools

Pneumatic Chisels and Blanks

Hand Chisels

"Dalbo" Air Hose Couplings and Fittings

"Dalweld" Detachable Welding Cable Connectors

PNEUMATIC DALLETT EQUIPMENT ACCESSORIES

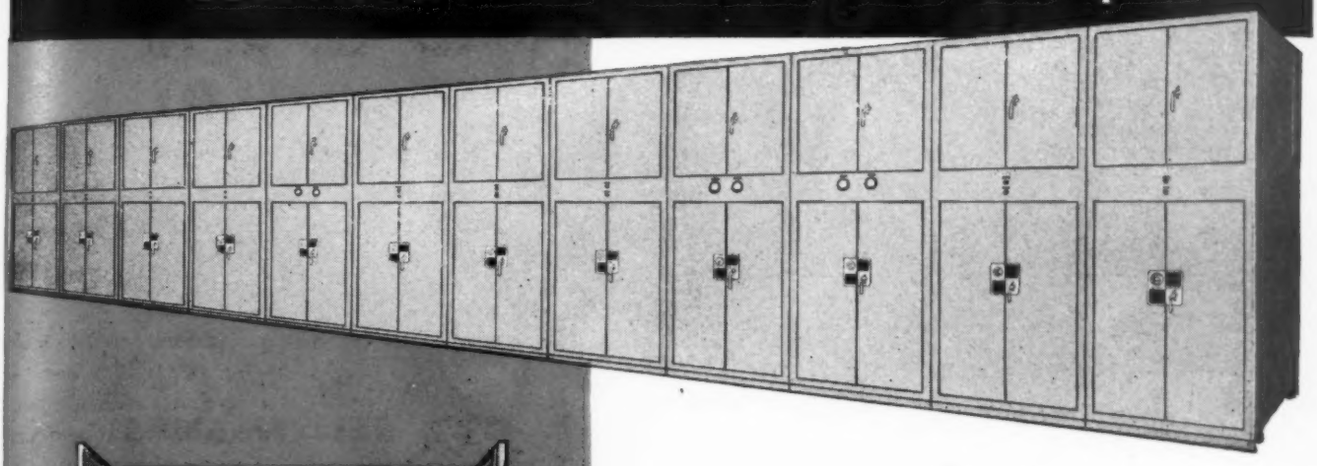
ESTABLISHED 1883

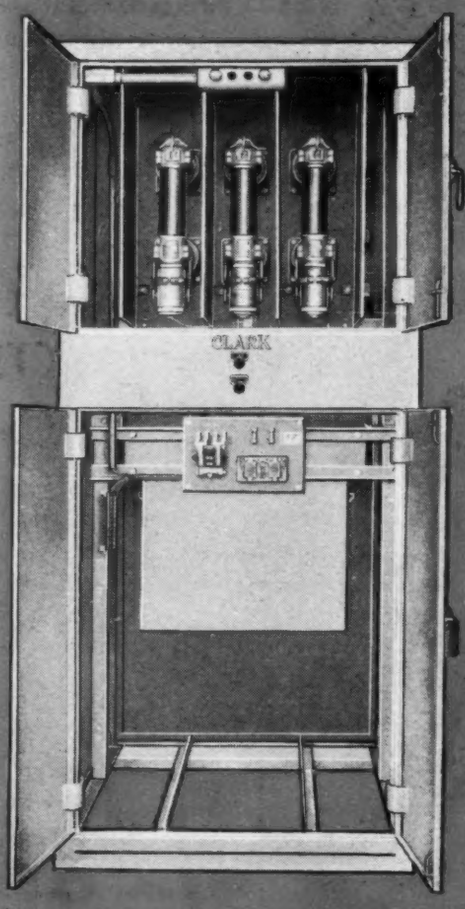
THE DALLETT COMPANY

MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA.

Manufacturers of Pneumatic Tools and Accessories

"3C" CENTRALIZED HIGH VOLTAGE MOTOR CONTROL *saves valuable time and space*





"3C" Bulletin 6018 Type HI Motor Starter —Front View, Open. Oil tank may be lowered to inspect and service contactors.

Factory-assembled Unit Steel Cubicle construction makes it possible to install any number of "3C" Bulletin 6018 Type HI Motor Starters in a compact group. By thus centralizing control stations, valuable floor space is conserved. Installation can be made in record time because you need connect only incoming and outgoing motor leads to put the entire group of controls in operation. Additional matching cubicles can be installed at any later time, maintaining uniform, streamlined appearance.

Bulletin 6018 High Interrupting Capacity High-Voltage Starters feature heavy-duty oil-immersed contactors for safe, reliable service. Thermal overload relays give full, dependable overload protection. Equipment is available for providing cubicles with starters for use with Squirrel Cage, Synchronous and Wound-Rotor Motors.

For complete information contact our nearest District office, or write for Bulletin 6018-HI for Squirrel Cage Motors, Bulletin 6405-HI for Synchronous Motors, and Bulletin 6100-HI for Wound Rotor Motors.

THE CLARK CONTROLLER CO.

1146 EAST 152nd ST., CLEVELAND 10, OHIO • EVERYTHING UNDER CONTROL

BUILDINGS AND BUILDING MANAGEMENT

Substitute Management

In talking with building managers about their problems and policies, we occasionally encounter managers who seem to take pride in knowing very little about the physical operation of their properties. The inference, presumably, is that they are personally too important to know much about such things as maintenance, rehabilitation and repairs.

Were this attitude less common, it might be laughed off as an amusing pose intended to impress visitors, but it is too widespread to be dismissed so lightly, and it seems to be spreading. Perhaps this is perfectly natural. It is hard to get very excited about efficient operation and tenant service when buildings are full, and resentful tenants have nowhere to go. It is much easier to sit back and let someone else operate the building, and that's exactly what many building managers seem to be doing.

They have forgotten, apparently, that efficient operation is the chief difference between building management and real estate brokerage. Any broker could rent space and collect rents in today's market, but most brokers would have difficulty in operating buildings successfully. That's why owners hire professional building managers. Otherwise, a real estate broker would do just as well, and be less expensive.

Actually, of course, a sound personal knowledge of building operation is one of the building manager's best tools in making buildings profitable. No one expects a building manager to know how to repair an elevator or build a wall or even mop a floor. That's not his job, but he almost certainly won't go far in his profession *unless he knows whether or not such work is being done properly, and whether or not his costs are in line with comparable costs in other buildings.* That is his job, and no one can do it for him.

Any building manager is, of course, thoroughly justified in delegating routine operating authority to competent subordinates — to the building superintendent, the chief engineer and others whose technical knowledge qualifies them to be department heads. But the manager who then sits back and lets these subordinates make operating policy decisions for him is flirting with serious trouble for himself, his owners and the properties under his supervision.

There is no satisfactory substitute for the building manager's brains, or for his ability to make sound operating decisions on the basis of his own knowledge. That's why he is the manager. To forget that is to invite someone else to operate his buildings in his place.

Charles McCaleb

Reproduced by permission from the September issue of Buildings and Building Management

OUR SENTIMENTS EXACTLY.. *Mr. McCaleb!*

Elevator Maintenance by the Manufacturer . . .
What better assurance of proper workmanship?

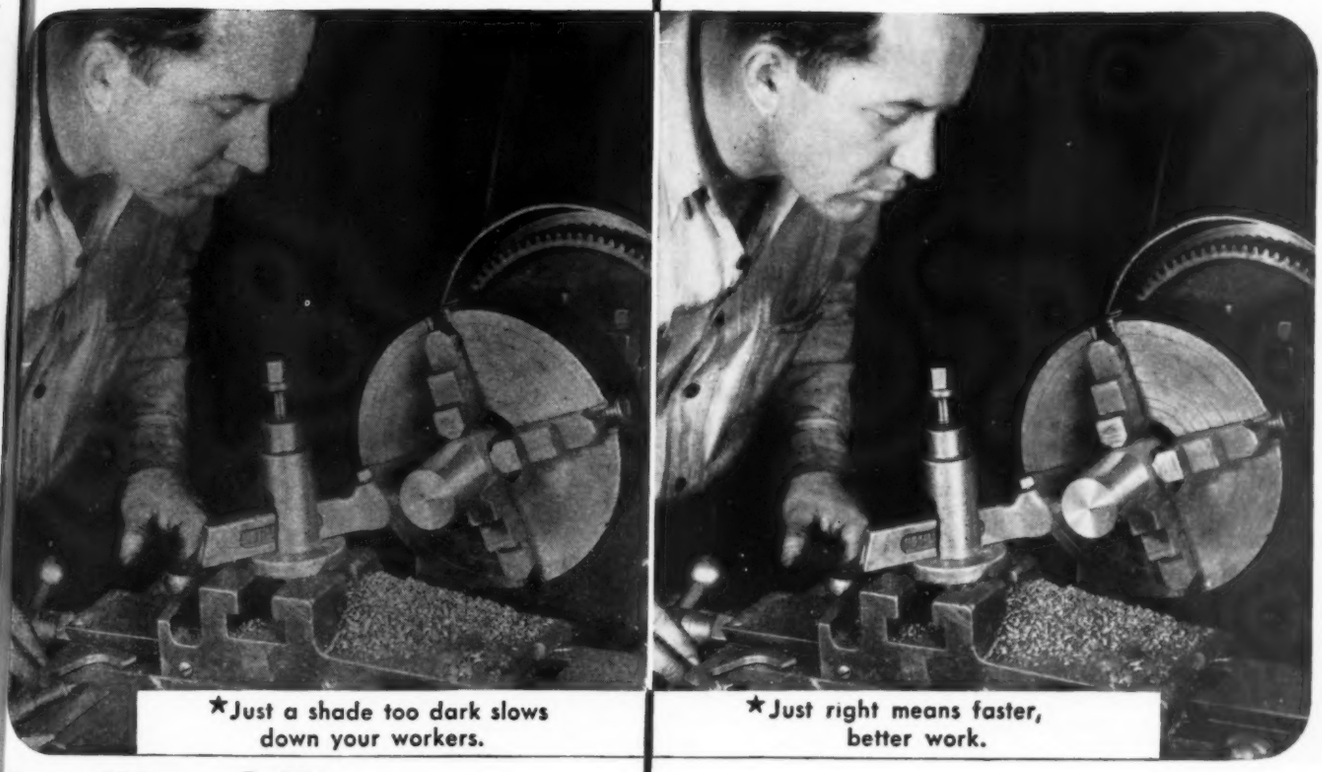
Standard rates now in effect on 30,000 elevators
What better assurance that costs are in line?

Maintenance by Otis, for Otis elevators, is available at a flat monthly rate through your local Otis Elevator Company office.

Otis
ELEVATOR COMPANY
OFFICES IN ALL PRINCIPAL CITIES

BORDERLINE VISION*

Stealing Production Time?



★Just a shade too dark slows down your workers.

★Just right means faster, better work.

Save Wasted Minutes With Wheeler Skilled Lighting!

"Borderline Vision" – lighting that's just a shade too dark may be robbing you of precious production time . . .

The time it takes a worker to take a second look. The time – and money – it costs you if work isn't just right. The little slow-downs that add up to an expensive lag in production.

For 65 years Wheeler has specialized in light engineering that eliminates such Borderline Vision. Wheeler Reflectors are designed to *control* light – to put light to work where it belongs – on the job. Their high reflection factor gets top illumination from standard lamps. And their rugged, porcelain-enamel coated construction means longer service – easier maintenance.

Don't be fooled by a lighting system that may look all right at a glance. Better, faster work is almost automatic when you install Wheeler Skilled Lighting. Write for full details on the complete line of Wheeler Fluorescent and Incandescent Reflectors now! **Wheeler Reflector Company, 275 Congress St., Boston 10, Mass.** Representatives in New York and principal cities.

Distributed Exclusively Through Electrical Wholesalers

All-Steel Open-End Fluorescent Unit
Available for two or three 40-watt, or two 100-watt lamps. Broad wiring channel with accessible, enclosed ballast. Mounts from chain or conduit, individually or in continuous runs.

RLM Solid Neck Incandescent Reflector

Maximum lighting efficiency for either indoor or outdoor use. Expertly designed, ruggedly built. 75 to 1500 watts.

Wheeler Reflectors

SKILLED LIGHTING

MADE BY SPECIALISTS IN LIGHTING EQUIPMENT SINCE 1881

LADISH

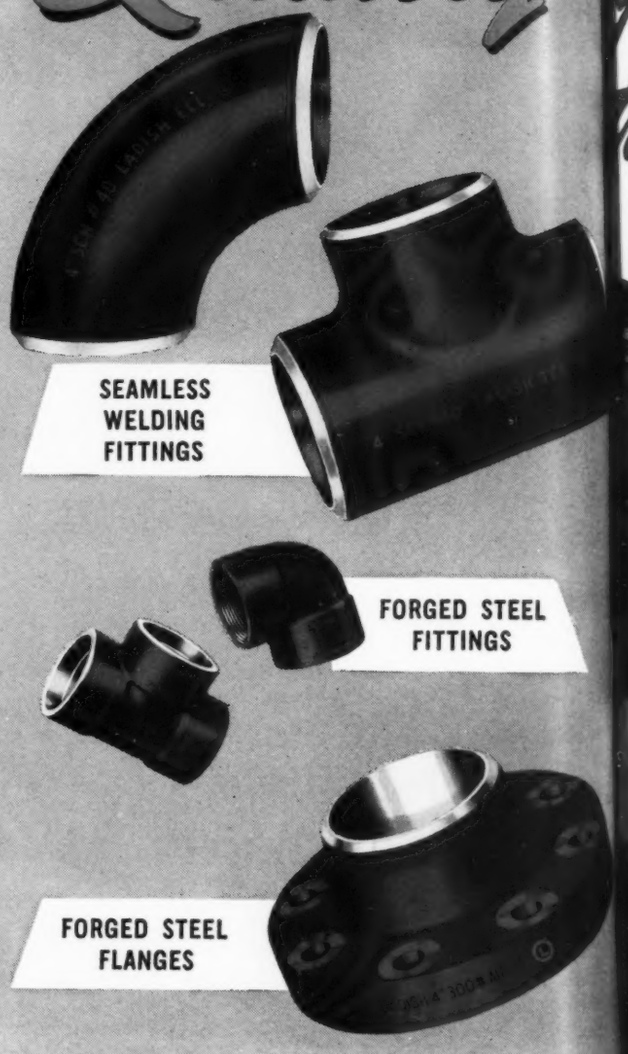
...WHAT IT MEANS IN GREATER DEPENDABILITY AND LONGER SERVICE FROM PIPING SYSTEMS

Controlled Quality is the distinguishing feature of every product in the complete Ladish line. Seamless Welding Fittings, Forged Steel Fittings and Forged Steel Flanges . . . all are produced under exacting metallurgical control and rigid inspection of physical dimensions.

Ladish Controlled Quality . . . made effective by one of the most modern and completely equipped metallurgical engineering laboratories in the industry . . . provides complete determination of chemical composition and physical properties of steel together with constant application of proper forging procedures and heat treating.

Thus users of Ladish Fittings and Flanges obtain higher dynamic strength . . . greater toughness . . . and increased resistance to shocks, strains and stresses common in piping installations. Advantages resulting from Ladish Controlled Quality provide the ultimate economy of longer life and greater dependability.

Controlled Quality



A COMPLETE LINE PRODUCED UNDER ONE RESPONSIBILI

Ladish catalogs, to assist in the design of piping installations and the proper selection of fittings and flanges, will be supplied upon request.

TO MARK PROGRESS

Controlled Quality

FITTINGS DIVISION

LADISH DROP FORGE CO.

CUDAHY • WISCONSIN (MILWAUKEE SUBURB)

District Offices: NEW YORK • BUFFALO • PITTSBURGH • CLEVELAND • CHICAGO • ST. LOUIS • HOUSTON • NEW ORLEANS • LOS ANGELES

To help solve your toughest training problems

This new 104-page book lists more than 1700 "ready-made" training films . . . Your copy *FREE*

Training Films

—another important function of photography

When you're teaching the "why" and "how" of a job, nothing makes so clear and lasting an impression as a good training film. With your free copy of the new book shown above, you can select some of the best ever made.

This 104-page book describes in clear and concise form more than 1700 slide and motion picture films now available from government bureaus, film distributors, and industrial concerns. It tells you where to get the films you want . . . which are free . . . which are for rent or sale, and the cost. Write today for your copy of "The Index of Training Films."

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Mail this coupon for FREE book

Eastman Kodak Company
Rochester 4, N. Y.

Please send me "The Index of Training Films."

Name_____

Company_____

Street_____

City_____

State_____

Kodak

A Candle Won't Broil a Steak

—and neither will inadequate wiring run electrical equipment at FULL CAPACITY

Wire ahead!

IF A MACHINE is running 1500 RPM, and it should run 1800 RPM, don't blame the operator. Chances are that *reduced voltage* is curtailing the machine's production. In fact, inadequate wiring can reduce efficiency as much as 25% to 50%!

Check up now on your *real* power needs! Don't let obsolete wiring handicap expensive production equipment. Remember that emergency alterations later may cost much more than foresighted wiring improvements today.

Talk it over with consulting or plant power engineer, electrical contractor or power salesman. They'll advise: Wire Ahead! Anaconda Wire & Cable Company, Subsidiary of Anaconda Copper Mining Company, 25 Broadway, New York 4, N. Y. Sales Offices in Principal Cities. 46390

Look to Anaconda for wire and cable controlled from copper ore to finished product by Anaconda basic research and engineering. Every Anaconda product is a lasting investment . . .

Check your wiring plans before they check you!

DON'T BE PENNY-WISE AND POWER-FOOLISH

ANACONDA

ANACONDA WIRE & CABLE COMPANY

Measured in COLD CASH... HERE'S HOW

AMERICAN PHILLIPS SCREWS

Pay Off to Refrigerator-Makers...

and to Refrigerator-Users, too

TO MANUFACTURERS: American Phillips Screws pay off in many ways, whether you build refrigerators or miniature trains. They speed up handling, increase worker-proficiency by building confidence, cut down losses from dropped screws, "drunken driving," scarred work-surfaces, spoiled material, and lost time from self-inflicted wounds. All because American Phillips Screws make power driving safe, easy, non-fatiguing . . . *and automatically straight.* Now total up the pay-off . . . and you'll find TOTAL TIME-SAVINGS RUN AS HIGH AS 50%.

TO CUSTOMERS: American Phillips Screws add the merchandising lure of handsome, modern, workmanlike appearance, inside and out . . . a look of quality that helps to make the prospect say: "That's for me!" This modern, cost-cutting method of fastening is actually *sales-promotion plus sales-protection.* Are *you* in on this payoff? Write American for recommendation of the type and metal of American Phillips Screws which will do the best job at lowest cost.

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

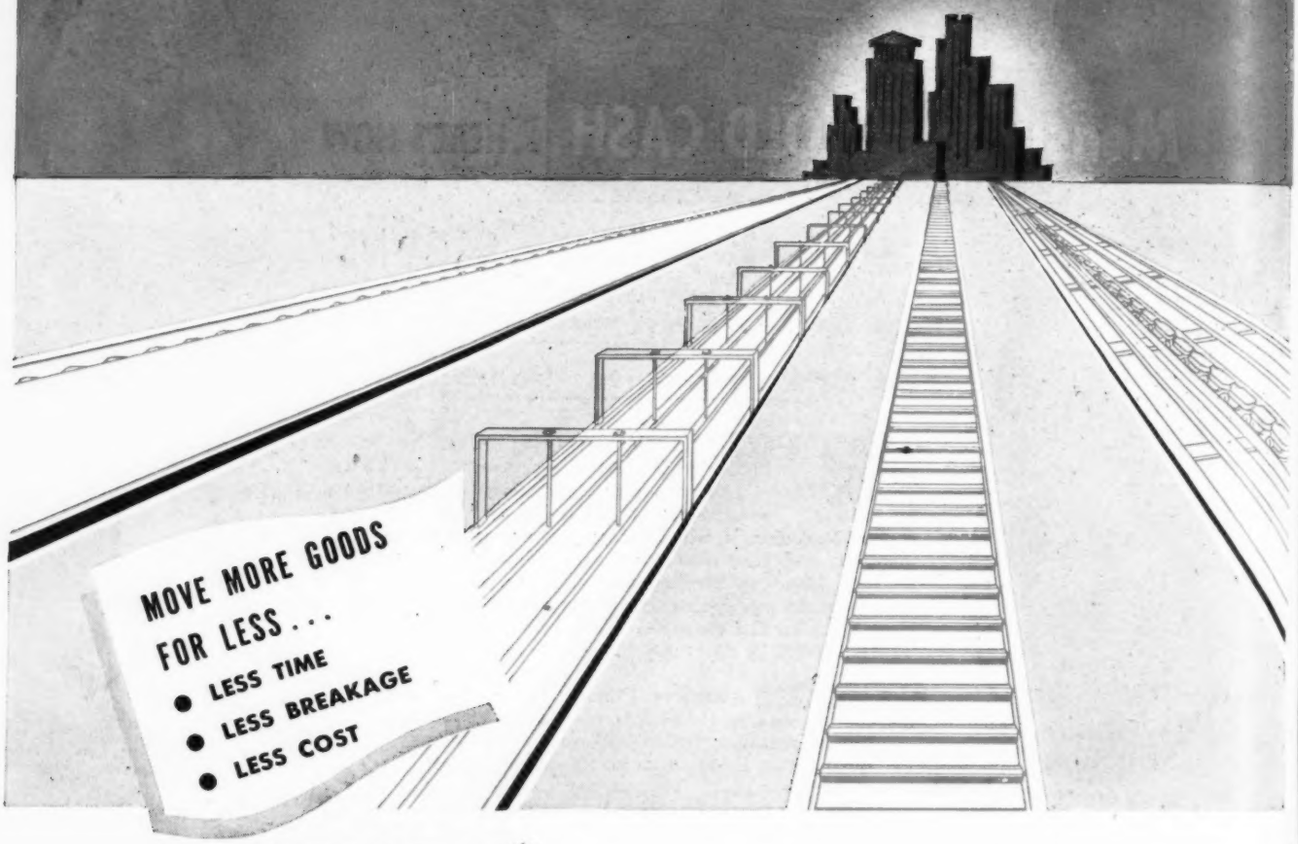
Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES
ALL METALS: Steel, Brass, Commercial Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

All Loads Lead to.. ALVEY

SAINT LOUIS

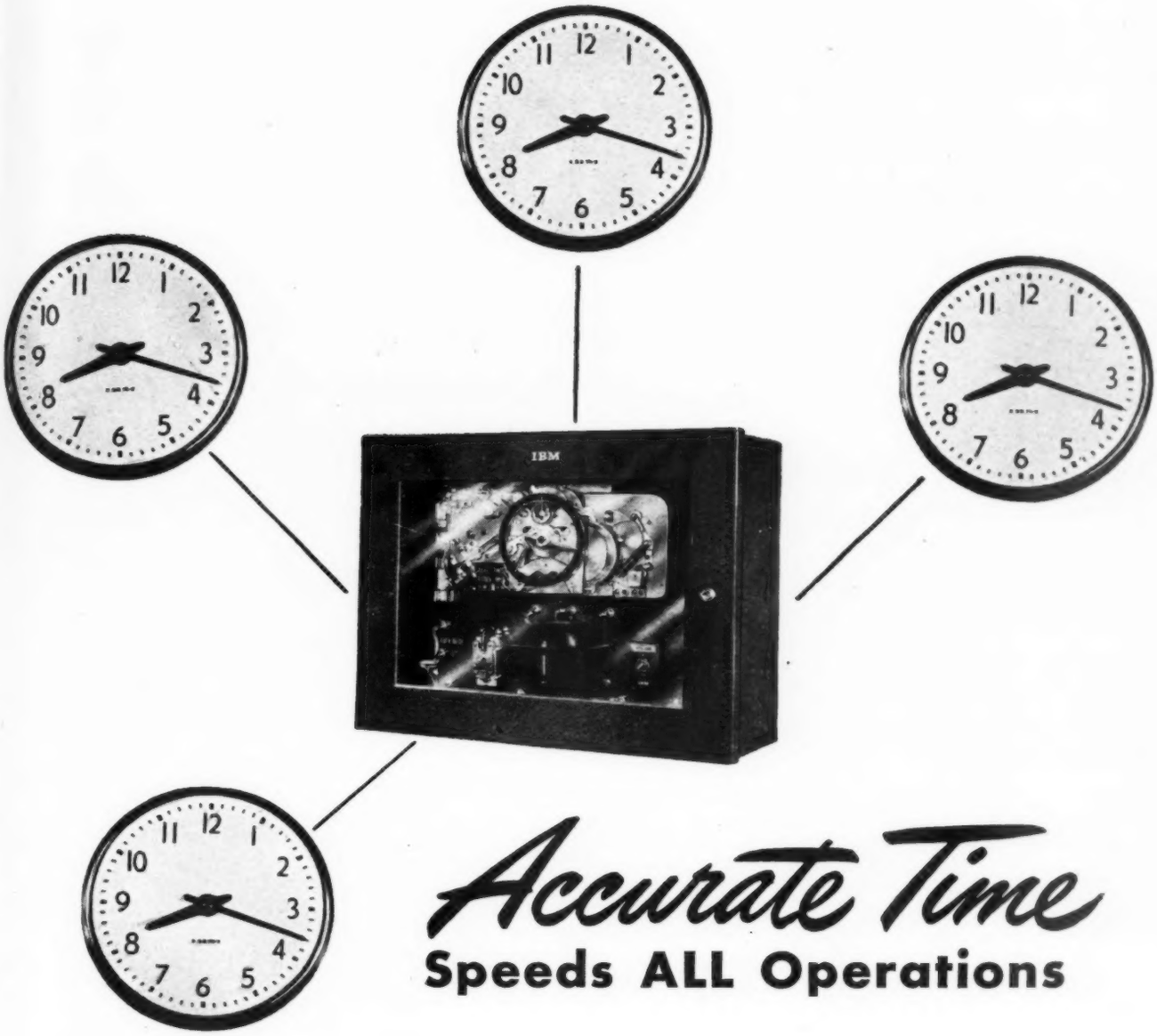


with **ALVEYORS*** the word for every **CONVEYOR** need!

*TRADE MARK

ALVEY ST. LOUIS *Conveyors*

ALVEY CONVEYOR MANUFACTURING CO., 3201 SOUTH BROADWAY, ST. LOUIS 18, MO.



Accurate Time
Speeds ALL Operations

With the installation of an IBM Time Control and Time Indicating System, all operations can be keyed to the same accurate time.

Secondary clocks and connected time recording devices of all types are automatically self-regulated every hour by this IBM Master Time Control unit.

The latest model of this unit even provides reserve operating power for use in the event of power interruptions. The unit also automatically regulates the rate of the clock to agree with the frequency rate of the electrical supply used.

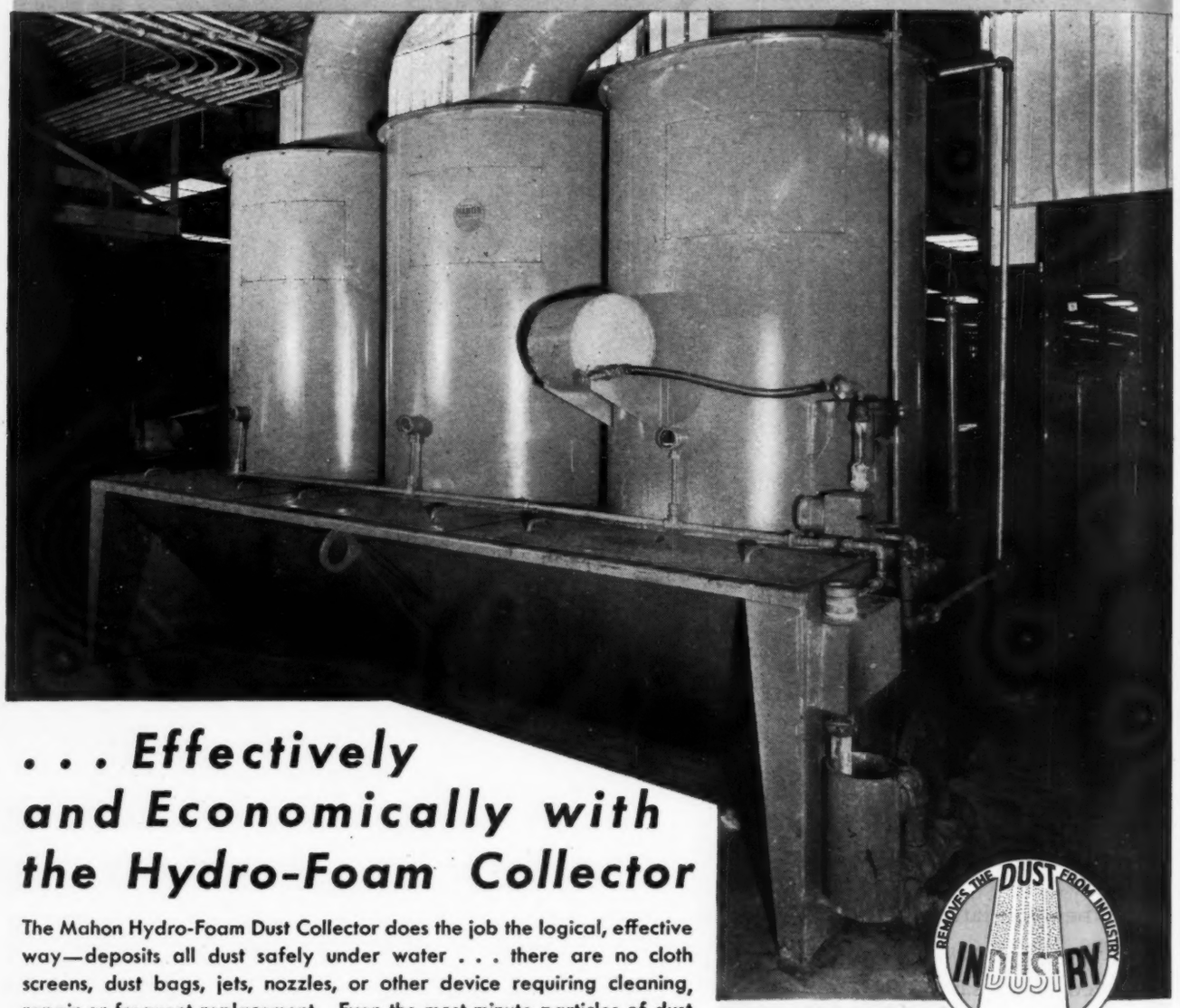
As an integral part of an IBM Time Control and Time Indicating System, this new unit automatically provides constant, accurate time year in and year out.

IBM

ELECTRIC TIME SYSTEMS AND TIME RECORDERS
ELECTRIC PUNCHED CARD ACCOUNTING MACHINES
AND SERVICE BUREAU FACILITIES
ELECTRIC TYPEWRITERS • PROOF MACHINES

International Business Machines Corporation, World Headquarters Building, 590 Madison Avenue, New York 22, N. Y.

Now You Can Eliminate DUST



. . . Effectively and Economically with the Hydro-Foam Collector

The Mahon Hydro-Foam Dust Collector does the job the logical, effective way—deposits all dust safely under water . . . there are no cloth screens, dust bags, jets, nozzles, or other device requiring cleaning, repair or frequent replacement. Even the most minute particles of dust are trapped and removed from the air by the Foam Bed. These collectors are produced in standard units of 3000 cfm capacity—multiple units are employed to handle any amount of air to cope with any dust condition. Have a Mahon engineer explain to you the advantages of this patented Hydro-Foam principle.

Address INDUSTRIAL EQUIPMENT DIVISION

THE R. C. MAHON COMPANY

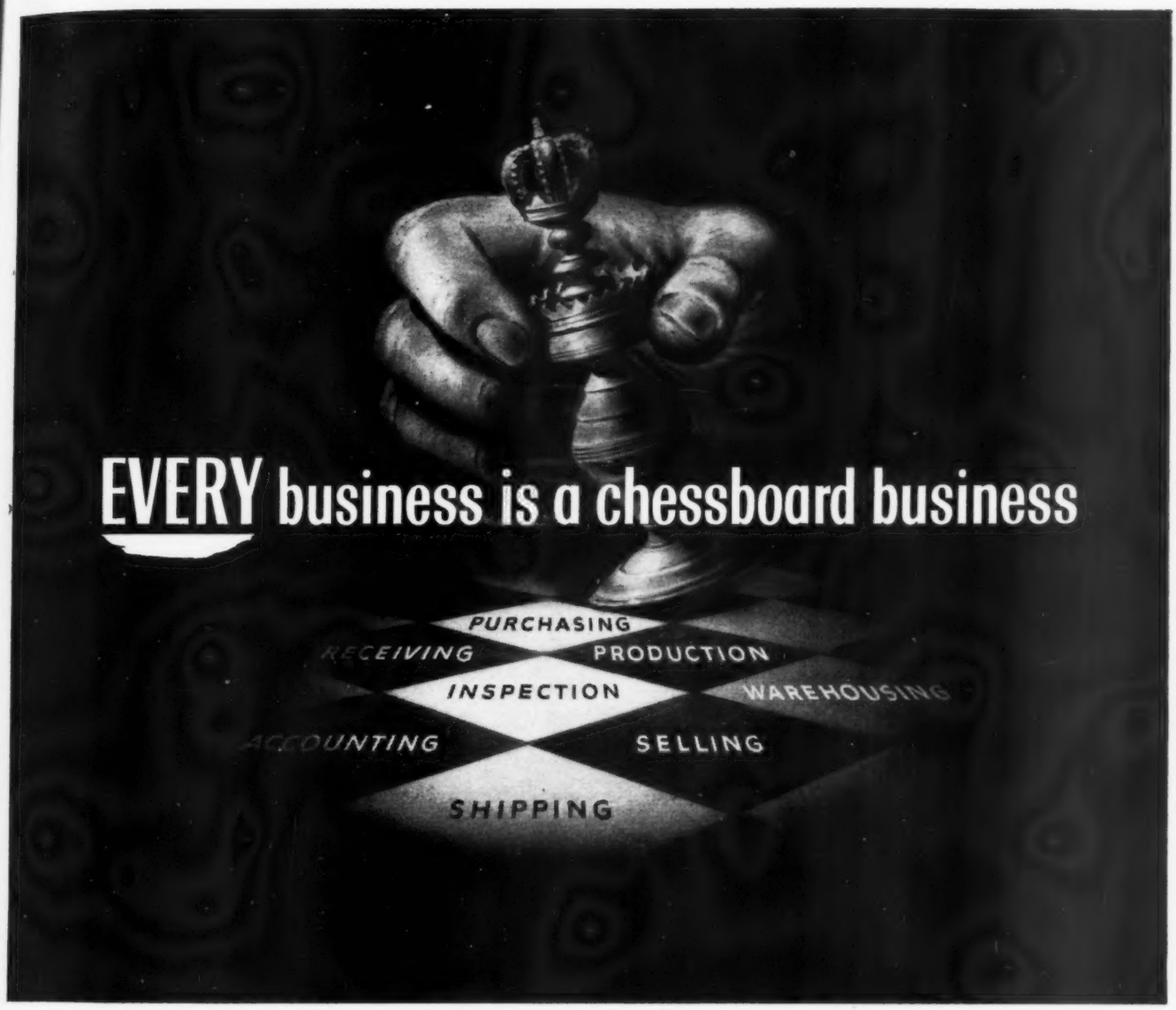
Detroit 11, Michigan • Western Sales Division, Chicago 4, Illinois

Engineers and Manufacturers of Dust Collecting Systems, Complete Finishing Systems, Annealing Ovens, Core Ovens, and many other Units of Special Production Equipment.

REMOVES THE DUST FROM INDUSTRY

The battery of Mahon Hydro-Foam Dust Collectors illustrated above is one of two batteries serving a buffing and polishing department in one of the great mid-west automobile plants. The patented Hydro-Foam Collector may be manifolded together in batteries of two, three or four to a common sludge tank, and any number of batteries may be employed to meet capacity requirements.

MAHON



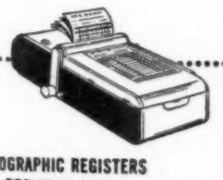
Careful there, Mr. Businessman . . . you're playing for profits. And the moves your product makes from planning to selling are all-important.

Better check into the forms responsible for these moves . . . the routine orders and records that guide such business functions as purchasing, receiving, production, inspection, warehousing, accounting, selling, and shipping. And if there's the slightest doubt as to the efficiency of your present forms, you'll want to call in your UARCO representative. Thousands of businesses, large and small, have done this—and found it to be one of their smartest business moves.

For fifty years UARCO has been streamlining business forms to meet the specific needs of thousands of diverse businesses. Your UARCO representative can show you how these forms have brought new speed, accuracy, and efficiency to routine operations . . . and impressive new savings to business budgets. Chances are, UARCO forms can do the same for your business. So call or write today. UARCO INCORPORATED, Chicago, Cleveland, Oakland. *Offices in All Principal Cities.*

For Instance . . .

UARCO Multi-Fold Continuous Forms permit typists and business machine operators to use their time more productively. The shuffling and arrangement of carbons is eliminated. Forms feed steadily through machine and up to 12 clear copies can be made at once.

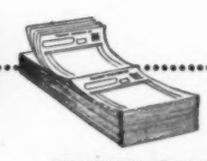


AUTOGRAPHIC REGISTERS AND REGISTER FORMS

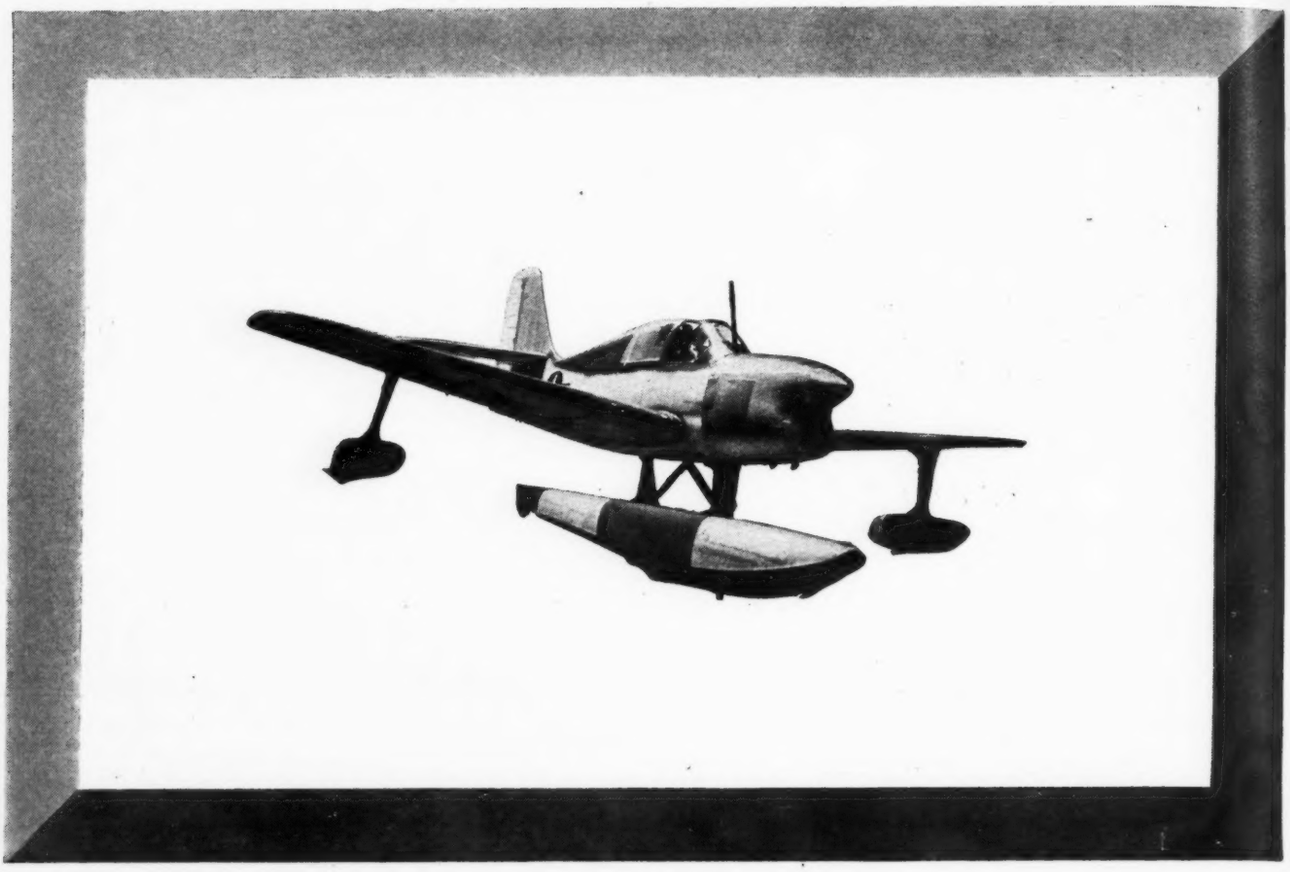
SINGLE SET FORMS

UARCO
INCORPORATED

BUSINESS FORMS



CONTINUOUS-STRIP FORMS FOR TYPEWRITTEN AND BUSINESS MACHINE RECORDS



Warehouse steels helped make this picture

Here's the latest in catapult-launched planes, designed and built for the Navy by Edo Aircraft Corporation. Every bit of alloy steel used in its construction came from a Frasse warehouse.

It's *that* convenient, when you're working with alloy steels, to work from Frasse alloy stocks. In commercial grades alone Frasse stock standards include *3135, 4150, 4615, 6145* and *6150* – either in cold finished (rounds and hex), hot rolled (rounds)—or both. For added convenience, all medium carbon grades are stocked either annealed or heat treated.

If your job demands aircraft quality, you'll find Frasse stocks equally handy. Frasse is a specialist in aircraft steels—stocks include both *X4130* and *X4340*, to appropriate Government specs.

Those NE grades now considered standard alloys are being maintained, too. Frasse continues to warehouse *NE 8620, 8630, 8635* and *8742* in commercial quality, and electric furnace aircraft quality in *NE 8630* and *8740*.

Complete details of Frasse alloy stocks—actual quantities and grades available for immediate delivery—are published monthly in the "Frasse Alloy Bar Inventory" bulletin. You'll find this bulletin an invaluable check list for your requirements in alloy bars. Send for your free copy of the latest issue today. *Peter A. Frasse and Co., Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200). 3911 Wissahickon Avenue, Philadelphia 29, Pa. (Radcliff 5-7100). 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000). Jersey City • Syracuse • Hartford • Rochester • Baltimore*

Peter A. Frasse & Co., Inc. 87N
17 Grand Street, New York 13, N. Y.

Please send me the latest issue of FRASSE INVENTORY of Alloy BARS

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

FRASSE

for alloy steels

Commercial and Aircraft Quality
Cold Finished or Hot Rolled
Open Hearth and Electric Furnace

A 3135
A 3140
X 4130
A 4150
X 4340
A 4615
A 6145
A 6150
A 8620
NE 8630
A 8735
NE 8740
A 8742

DON'T JUST DRILL IT...

SKILDRILL IT!

There are all kinds of ways to drill a hole . . . but only one way to do it better, faster, easier . . . that's with a SKILDRILL. Ask your distributor today about a demonstration.

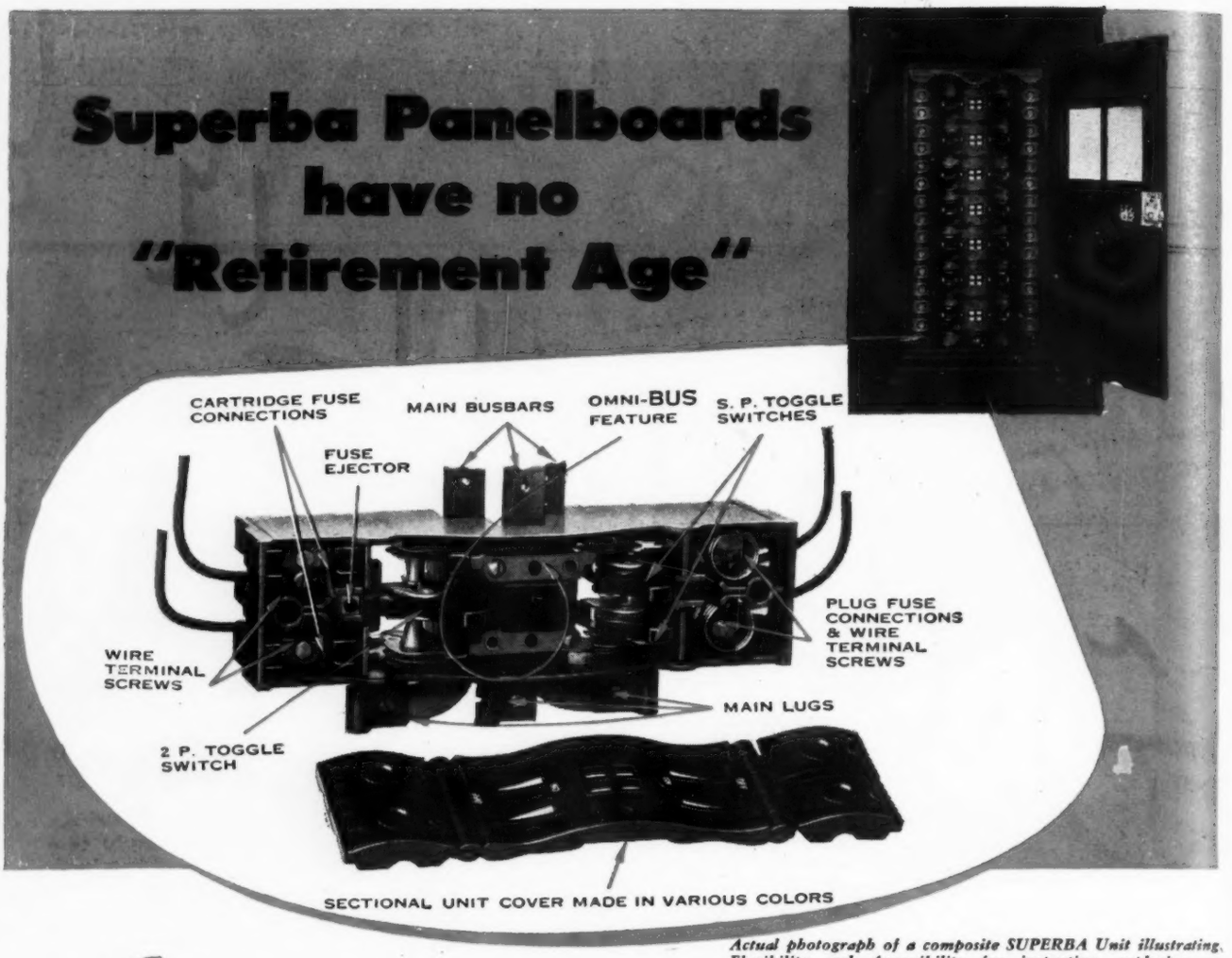
SKILSAW, INC.
5033 Elston Ave., Chicago 30, Ill.
Factory Branches in All Principal Cities

PORTABLE ELECTRIC
SKILTOOLS

SKILSAWS SKILSANDERS SKILSHEAR SKILNIBBLER SKILGRINDERS SKILDRILLS

MADE BY SKILSAW, INC.

Superba Panelboards have no "Retirement Age"



Actual photograph of a composite SUPERBA Unit illustrating, Flexibility and Accessibility for inspecting, replacing or interchanging Toggle Switches, Fuse Connections or Bus Bar arrangements without removing cabinet door or trim.

6 FEATURES ... the secret of adaptability

Many a panelboard has been put out to pasture because it couldn't meet the challenge of changing electrical conditions.

But you need never worry about obsolescence when you install BullDog SUPERBA. There are six separate features of design and construction to insure complete safety, peak performance, unusual convertibility, easy maintenance and long life. Look them over:

1. **Toggle Switches:** Sturdy construction to withstand abuse . . . positive operation . . . quick make and quick break.
2. **Switch and Fuse Safety Interlock:** Doors over fuse compartments are interlocked with toggle switches so that fuses are always "dead" when accessible, although fuses can still be tested in circuit.
3. **Fuse Ejector:** In cartridge fuse type. Just a flip of the finger ejects the cartridge fuse with safety and convenience.
4. **Omni-bus Construction:** Permits ready change of voltage and phase, and balancing of load on the phases, after the panel is installed and without removal of door or trim or disturbing branch circuit wiring.
5. **Isolation Compartments:** Bus bars, fuses and switches are in separate compartments, preventing flash-overs and localizing trouble from short circuits or defective fuses.
6. **Smart Styling:** Surface or face plates of bakelite have a curved design with a variegated grain finish, lending beauty and symmetry to the panel's appearance.

Check these six advantages of SUPERBA Panelboards, and write for complete details on this modern, completely flexible equipment.

SUPERBA is adaptable to any of these systems:

125/250 V. Single Phase AC or DC Edison System.
125/250 V. Grounded Neutral Single Phase AC or DC Edison System.
125/250 V. Grounded Neutral 3 to 3-Wire Single Phase AC or DC Edison System.
120/208 V. 3-Phase, 4-Wire AC.
125 V. 3-Phase to Single Phase AC.
125 V. 2-2 Wire.

BullDog Also Manufactures Vacu-Break Safety Switches—BUStribution DUCT—Switchboards—Circuit Master Breakers—Industrial Trol-E-Duct for Portable Tools, Cranes and Hoists—Universal Trol-E-Duct for completely flexible lighting.

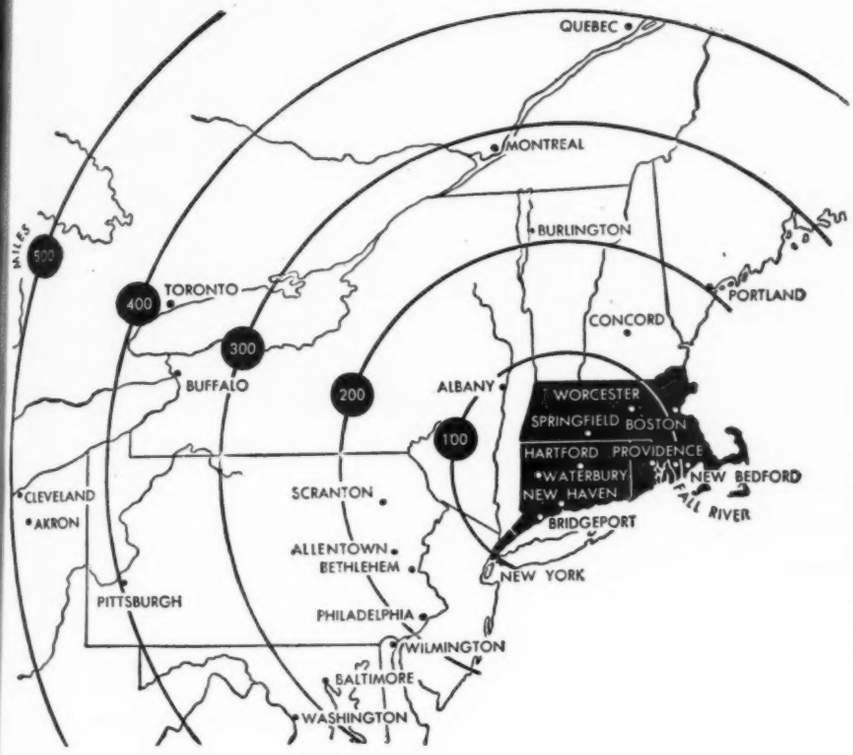
BULLDOG

ELECTRICAL DISTRIBUTION SYSTEMS

BULLDOG ELECTRIC PRODUCTS COMPANY, DETROIT 32, MICHIGAN

In Canada: BullDog Electric Products, Ltd., Toronto. Field Engineering Offices in All Principal Cities

Looking for Bigger Markets?



35 of America's 100 largest cities are within 500 miles of the center of Southern New England.

Within this same 500 mile radius live 58,317,815 people with the highest potential buying power in the world. One indication of the sales opportunities which exist here is the fact that the U. S. portion of this fertile market paid 50% of all income taxes received by our Federal Government.

Easy access to millions of people with money to spend is one of many factors in your favor when you locate your industry in Southern New England.

For a complete, factual resume of *all* advantages, write for the new 32-page booklet, "SOUTHERN NEW ENGLAND FOR TOMORROW'S INDUSTRY." Address: P. E. Benjamin, Mgr., Industrial Development, New Haven R. R., Room 201J, 80 Federal Street, Boston 10, Mass.

THE NEW HAVEN R. R.

SERVING NEW YORK AND THE GREAT INDUSTRIAL STATES OF MASSACHUSETTS, RHODE ISLAND AND CONNECTICUT . .

Current Status of Personnel Testing in 100 Organizations. Forrest V. Routt, Jr. California Council of Personnel Management, 870 Market Street, San Francisco 2. 26 pages. Sample test forms, tables, graphs. $1.

COMMUNIST INFILTRATION IN THE UNITED STATES—Its Nature and How to Combat It. Chamber of Commerce of the United States, Washington 6, D. C. 40 pages. Bibliography. No charge.

CENSUS PUBLICATIONS SUBJECT GUIDE, Jan.—June, 1946. U. S. Department of Commerce, Bureau of the Census, Washington 25, D. C. 176 pages. No charge.

ADDRESSES ON INDUSTRIAL RELATIONS—1946. Bureau of Industrial Relations Bulletin No. 17. University of Michigan Press, Ann Arbor, Mich. 87 pages. $1.50.

on the calendar . . . . .

DECEMBER

2-6, American Society of Mechanical Engineers, Annual Meeting, Hotel Pennsylvania, New York. Ernest Hartford, Executive Assistant Secretary, 29 West 39th St., New York 18.

2-7, 17th National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York. Charles F. Roth, Manager, 480 Lexington Ave., New York 17.

4-6, National Association of Manufacturers, 51st Congress of American Industry, Waldorf-Astoria, New York. Gail G. Geddes, Director, 14 West 49th St., New York 20.

6-7, The Society for the Advancement of Management, Inc., Annual Meeting, Hotel New Yorker, New York. Carl S. Coler, Executive Director, 84 William St., New York.

6, American Leather Belting Association, Annual Meeting, Commodore Hotel, New York. E. R. Rath, Executive Vice-President and Secretary, 41 Park Row, New York.

15-18, The American Society of Refrigerating Engineers, 42nd Annual Meeting, Hotel Pennsylvania, New York. Dr. David L. Fiske, Secretary, 40 West 40th St., New York.

JANUARY

6-10, The Society of Automotive Engineers, Inc., Annual Meeting, Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

14-17, National Materials Handling Exposition, Concurrent 4-Day Program of Prepared Papers and Discussions, Public Auditorium, Cleveland. Clapp & Polliak, Inc., Managers, 37 Wall St., New York.

27-30, American Society of Heating and Ventilating Engineers, 53rd Annual

Tool Life Increased 50% with Improved Cutting Oil

TRANSPARENT, STAIN-PROOF OIL PRODUCES GRATIFYING RESULTS

Lubrication Engineer's Report

"We knew from certain operating conditions on a Landis automatic threading machine at a prospect's plant* that we could do a better job with Chillo No. 3 than was being done with a competitive product having approximately 14% lard and 1% sulphur compound.

"The operation being performed was threading 14 to 16 foot bar stock from all grades of materials as to hardness and all sizes from ½ inch to 2 inches. On 16 foot bars of 1 inch, 1¼ inches and 1½ inches dimensions the average output was four bars of 64 feet per chaser grind with the 14% lard and 1% sulphur compound oil, and on under one inch bars the average output was 6 bars or 96 feet. The average speed or RPM while threading was 50 to 64 on the one inch and over, while the average on the under one inch was 64 to 84, depending on the hardness of the metal.

Tool Life Increased

"Although the threads were good and acceptable with the oil in use, we produced a much more uniform and smoother thread with Cities Service Chillo No. 3. We increased the tool life from four bars on the one inch and over to six and sometimes seven or an average of 100 feet per chaser grind. The under one inch production per chaser grind was increased to nine bars or approximately 140 feet.

Production Stepped Up

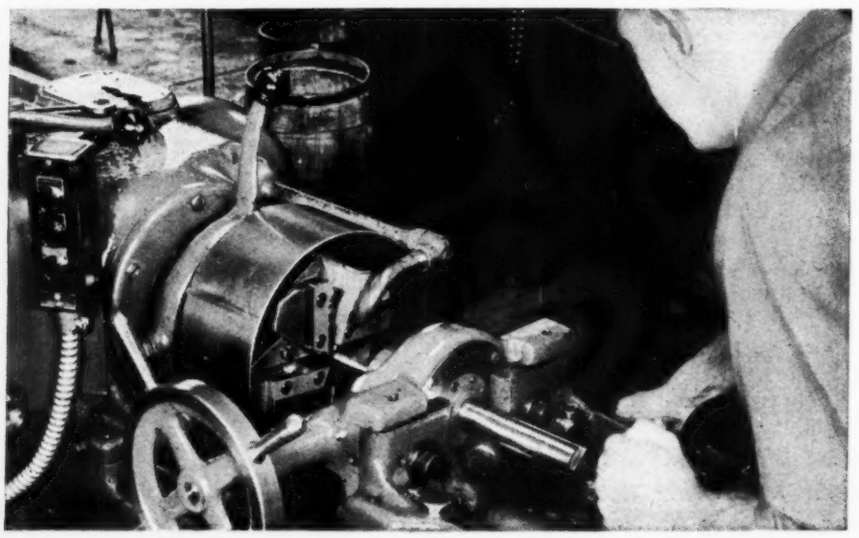
"We stepped up production by increasing the RPM on the under one inch bars to 84, 90, or 106, depending on the hardness, and increased the larger stock bars to 64 and 84 RPM.

"We were requested to supply a transparent oil that would not leave stains on the finished product. With this in mind and knowing that the plant would be very critical should some work become stained, we recommended Chillo No. 3 for the job with very gratifying results."

Cities Service makes available to any industrial organization operating in its marketing territories East of the Rockies, a highly specialized lubrication engineering service. If you're facing a metal-working problem—don't delay—call your local Cities Service office (in the South call Arkansas Fuel Oil Company), or write to Cities Service Oil Company, 60 Wall Tower, New York 5, N. Y.

Engineering Service Available

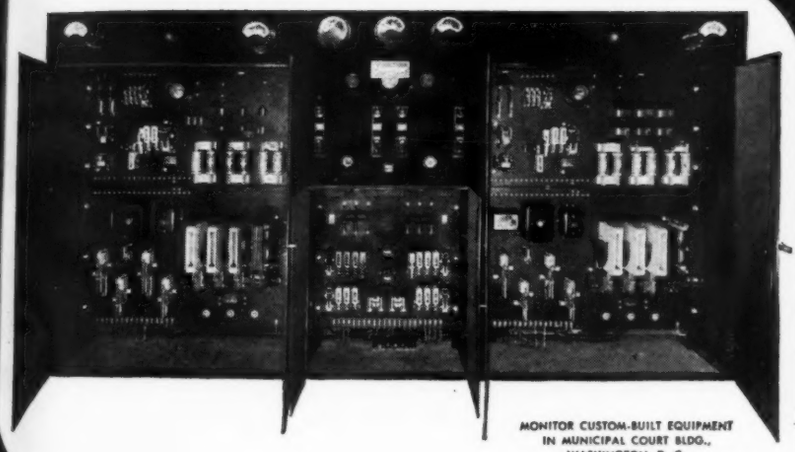
*Name on request.



CITIES SERVICE OILS
ONCE-ALWAYS

FOR EVERY LUBRICATION PROBLEM CALL Cities Service FIRST!

Our Specialty
CUSTOM-BUILT MOTOR CONTROLS



MONITOR CUSTOM-BUILT EQUIPMENT IN MUNICIPAL COURT BLDG., WASHINGTON, D. C.

Designed and Built to your Specifications

One of the newer structures in Washington is the Municipal Court Building. At time of construction, engineers set forth many unusual specifications and requirements for control of air-conditioning apparatus.

Because of its unique ability to design and build electric motor control equipment to exact customer specifications, Monitor got the job. Above you see the result—with all requirements met in a "more than satisfactory" manner.

For over 50 years Monitor has specialized in building *your* specifications and *your* requirements into specialized controls of all types, for all purposes—including printing presses, machine tools, synchronous motors, pumps, laundries, ventilating fans, dairies and many more.

So when you have an unusual control problem, be sure to consult your nearby Monitor Field Engineer. His service is prompt, efficient . . . and his specialized knowledge will save you time and money.

"If it's Custom-Built Monitor Builds it Better"

The Monitor Controller Company
BALTIMORE 2, MARYLAND

CANADIAN AFFILIATE • CANADIAN CONTROLLERS LTD • TORONTO, ONTARIO, CANADA

periodicals, including information on codes and standards.

LABOR MONOPOLIES—OR FREEDOM

JOHN W. SCOVILLE. Committee for Constitutional Government, Inc., 205 East 42nd St., New York 17. 167 pages. Photographs, cartoons, tables, bibliography. Single copies, $1; lower prices in quantities.

A discussion of labor unions and collective bargaining by a consulting economist, who believes that "most of the thinking about labor unions is based on emotionalism rather than reason." He discusses basic principles involved in labor issues, and points out pitfalls the employer should be aware of in answering questions about wages and collective bargaining.

WATER TREATMENT AND PURIFICATION

WILLIAM J. RYAN, M. E. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18. 270 pages. Formulas, charts, diagrams, graphs, sketches, photographs, appendix, index. $2.75.

Second edition. Written for engineers, plant operators, and technical men, this book answers questions on various treatments used for removing impurities from water. It describes and illustrates the design and operation of sedimentation tanks, coagulation basins, chemical feeding devices, filtration plants, softening apparatus, ion exchange apparatus, sterilization processes, and states the chemical reactions that take place.

HOW TO HANDLE PROBLEMS OF SENIORITY

JOHN A. LAPP, LL. D. National Foremen's Institute, Inc., Deep River, Conn. 295 pages. Forms, index. $4.

Third in a group discussing principles and practices in labor relations. Causes for the recent widespread interest in seniority are analyzed, and requirements of law and of labor contracts are discussed. Examples of specific problems involved when layoffs or rehiring are under consideration are included, as well as procedures to follow when handling seniority disputes.

booklets

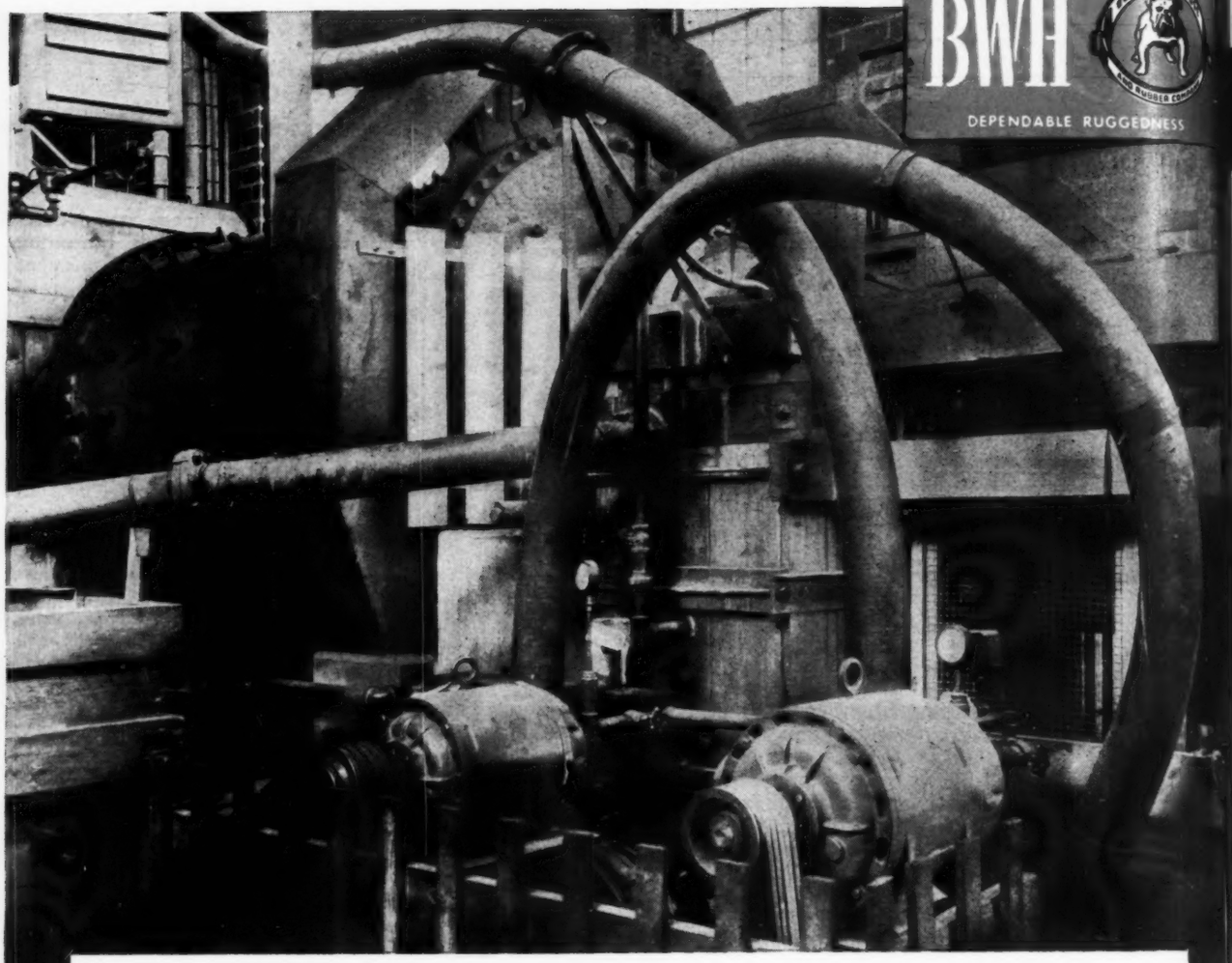
SELECTED READING LIST ON INDUSTRIAL RELATIONS FOR SUPERVISORS. Industrial Relations Section, California Institute of Technology, Pasadena 4, Calif. 8 pages. Index. Single copies, no charge; quantity prices quoted upon request.

MANUAL OF EMPLOYMENT INTERVIEWING. Research Report No. 9. American Management Association, 330 West 42nd St., New York 18. 75 pages. Forms, bibliography. $1.50 to members; $2.25 to non-members.

PERSONNEL TESTING. A Field Check on the

BWH

DEPENDABLE RUGGEDNESS



ROUGH CUSTOMER HANDLED SMOOTHLY BY

BWH ORE-HANDLING HOSE

To refine magnetite, it must be run through a series of hoppers that separate the ore from the waste sand. Carrying this heavy, highly abrasive ore to and from the hoppers requires hose that is highly flexible and has amazing durability. BWH solved the problem for a leading foundry with Bull Dog Ore Handling Hose.

This sturdy hose has multiple plies of heavy duck wound over a strong, one-inch-thick rubber lining. Beneath the two outer plies is a high tensile spiral wire imbedded in rubber. Spaced to give the hose maximum flexibility, the wire also adds strength and prevents kinking. Finally, a high-grade, wear-resistant protective rubber cover encloses tube and fabric. Fittings are of the outside sleeve type; thus no metal comes in contact with the abrasive ore . . . and service of the hose is indefinitely prolonged.

When you require this or other types of industrial rubber goods, look to BWH for dependable ruggedness . . . BWH distributors, for dependable service.

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearby BWH distributor, or write direct to BWH.

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS.. U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

★DON'T YOU BELIEVE IT!

You can never hope to get better than third-rate loyalty from any employe through the pay envelope alone. His first interest is self-interest; and a close second, his family. What result you get for your wage dollar depends on how strongly he's made to feel that third-rate loyalty to his employer.

Recognize the significance of your man's first loyalty—to himself—harness it and it will work for you far more effectively than his hands alone. How individual recognition promotes mass loyalty is explained in our new booklet, "Loyalty Is Built—Not Bought". It discusses what your employes are thinking about—what they actually want, rather than what they ask for.

YOUR PERSONAL COPY of this important booklet will come to you by return mail when you write for it on your company letterhead. Please address Mr. George A. Bond.

GORDON B. MILLER and COMPANY
809 WALNUT STREET, CINCINNATI 2, OHIO

personnel practices, staffing the organization, and management controls.

FLUORESCENT SERVICE AND MAINTENANCE MANUAL

Sylvania Electric Products, Inc., Dept. MA-3, 211 Derby St., Salem, Mass. 80 pages. Charts, graphs, sketches, working diagrams, glossary of terms, index, cross-reference subject index. $1.

This pocket-size book, written for contractors, engineers, electricians, and wholesalers, discusses fluorescent lamp operation and the various problems encountered in the maintenance of fluorescent systems. Trouble shooting, testing procedures, cleaning methods, and repair problems are illustrated with working diagrams and sketches.

WHO'S WHO IN LABOR

Edited by **MARION DICKERMAN** and **RUTH TAYLOR.** The Dryden Press, 386 Fourth Ave., New York 16. 480 pages. $12.53.

This volume includes more than 5000 authorized biographies of men and women active in the field of labor in the United States and Canada. In addition, it contains a list of international labor unions, a directory of the labor press, a list of educational and research directors, a chronology of labor legislation, a glossary of labor terminology, edited by Dr. John R. Steelman, the constitutions of both the American Federation of Labor and the Congress of Industrial Organizations.

HOW TO USE HANDICAPPED WORKERS

ARTHUR T. JACOBS. The National Foremen's Institute, Inc., Deep River, Conn. 186 pages. Charts, tables, work forms, index, appendix. $3.50.

The physical demands of various types of jobs in industry are analyzed to determine the characteristics essential to a capable worker. Methods of evaluating the capacities of handicapped workers are discussed, as are techniques of matching the handicapped with jobs they can fill, as well as breaking them in on new jobs. The 80-page appendix summarizes various physical and mental handicaps, evaluates their effect on working ability, lists particular points to check in placement interviews. The specific requirements of 105 different occupations are summarized and indexed.

ASME MECHANICAL CATALOG AND DIRECTORY, 1947

American Society of Mechanical Engineers, 29 West 39th St., New York 18. 792 pages. Photographs, tables, charts, sketches, diagrams. $3.50.

Thirty-sixth annual edition. In four sections: catalogs, describing and illustrating items used by industry in manufacturing its products and maintaining its plants; directory, listing the source, by means of an index of firms, of equipment needed by mechanical engineers; an alphabetical list of trade names; and a listing of ASME publications and

For efficient lubrication the year-round, lower operating costs,

take these two easy steps

Call in a Gulf Lubrication Engineer — **Adopt Gulf Periodic Consultation Service**

HERE'S a practical plan for modernizing your lubrication practice—to help your machines and equipment meet today's increasing production requirements.

Through Gulf Periodic Consultation Service you get effective and continuous assistance on your lubrication problems from an experienced Gulf Lubrication Engineer. This trained specialist will consult regularly with your operating and maintenance men—give you the benefit of latest developments in petroleum science.

Call in a Gulf Lubrication Engineer today and ask him for additional information on this advanced plan. Write or phone your nearest Gulf office.

Gulf Oil Corporation • Gulf Refining Company, Gulf Building, Pittsburgh, Pa.
DIVISION SALES OFFICES: Boston • New York • Philadelphia • Pittsburgh • Atlanta • New Orleans • Houston • Louisville • Toledo

GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

Check

YOUR UNDERGROUND WATER LINE PROBLEM

... and see how

TRANSITE SAVES

INSTALLATION COSTS

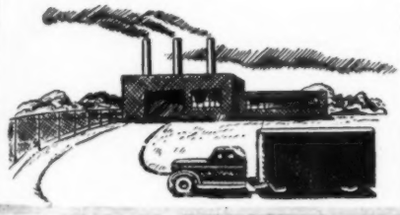
Transite Pressure Pipe is light in weight, easy to handle and install. Only the larger sizes require mechanical handling equipment. And the Simplex Coupling assures fast assembly even by inexperienced crews.

MAINTENANCE

Performance records prove Transite's high resistance to corrosion, even in aggressive soils such as cinder fills and salt marshes. Transite's tough durable structure and high uniform strength are added assurance of continued low maintenance costs.

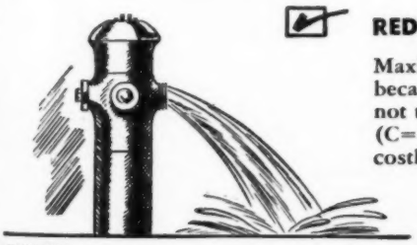
UNDERGROUND LEAKAGE

The Transite Simplex Coupling protects against leakage because it is tight, yet flexible. It absorbs the vibration of heavy trucking . . . its tightness guards against washing away of supporting soil and undermining of the pipe.



RED WATER

Because Transite is made of asbestos and cement, pipe rust can never affect the quality of your water supply. This pipe will not rust—eliminating the possibility of "red water" or rusty scale. It helps keep clean water *clean.*



REDUCED FLOW CAPACITY

Maximum flow is assured by Transite, because this asbestos-cement pipe cannot tuberculate. Its high initial capacity (C=140) can never be reduced by this costly form of interior corrosion.

For details, write Johns-Manville, Box 290, New York 16, N. Y.

JM

Johns-Manville

TRANSITE PRESSURE PIPE

for Water Supply Lines • for Fire Lines • for Process Lines

books

JOB EVALUATION

FORREST HAYDEN JOHNSON, Organization Research Manager; **ROBERT W. BOISE, Jr.,** Chief Industrial Engineer; **DUDLEY PRATT,** Handbook Editor; all of Boeing Aircraft Company. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. 288 pages. Sketches, charts, forms, sample worksheets, bibliography, index. $3.75.

A composite of job evaluation systems in use throughout industry is here analyzed, showing how a planned formula, adapted to specific conditions involved in any particular plant, will work out in practice. The basic procedures underlying the job-rating system, the analytical nature of job evaluation, relationships between the evaluating system, the employees, and the company's organization are discussed, together with a presentation of the steps necessary to install and maintain an effective job evaluation program.

THE ELECTRONIC CONTROL HANDBOOK

RALPH R. BATCHER, E. E., Radio Engineering Consultant, Consulting Editor, "Electronic Industries," and **WILLIAM MOULIC,** Associate Editor, "Electronic Industries." Caldwell-Clements, Inc., 480 Lexington Ave., New York 17. 344 pages. Photographs, sketches, working diagrams, tables, formulas, graphs, bibliography, index. $4.50.

The five sections of this volume cover "Basic Elements of Control," "Conversion Elements," "Electronic Modification Circuits," "Activation Elements," and "Control Motors." Application of these electrical and electronic principles in automatic control and regulation in the production of synthetic rubber, fabrics, chemicals, etc., is explained. The versatility of electronic systems is discussed, and various physical data have been grouped with corresponding electronic principles in order to permit analysis as well as synthesis of control systems.

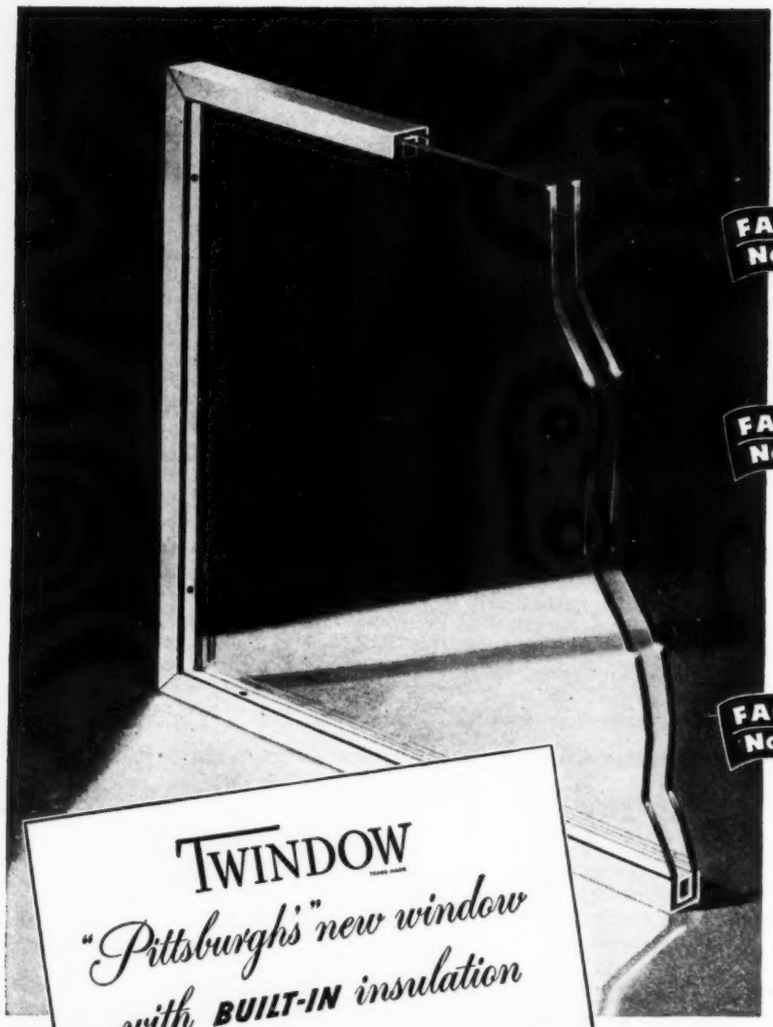
FUNDAMENTALS OF SUCCESSFUL MANUFACTURING

G. G. HYDE, Consulting Engineer. McGraw-Hill Book Co., 330 West 42nd St., New York 18. 201 pages. Charts, tables, diagrams, forms, case histories, index. $2.50.

One of the "Industrial Organization and Management Series." This book provides an analysis of modern manufacturing, useful either in establishing a new enterprise or bringing up to date an existing one. Emphasizing the need for good organization, and for the development of an objective viewpoint in the consideration of manufacturing problems, the author discusses specific aspects of the manufacturing process. Among these are the designing and processing of the product, housing,

It will pay to read these FACTS about TWINDOW

TRADE-MARK



FACT No. 1

Twindow is the newest development in insulating windows

It consists of two or more panes of glass with a hermetically sealed air space between, and a protecting frame of stainless steel. Twindow is the result of "Pittsburgh" research to create an economical window unit combining transparency with built-in insulation.

FACT No. 2

Twindow saves money on heating and air-conditioning

Twindow with two panes of glass has more than twice the insulating efficiency of ordinary windows. With three or more panes, the insulating efficiency is still further increased. This saves money by reducing the load on heating and air-conditioning equipment. It not only saves fuel . . . it makes practical more and larger windows so that rooms can be flooded with natural daylight. More use of daylight will cut lighting bills.

FACT No. 3

Twindow makes any building more comfortable and more healthful

It helps to maintain proper temperature and humidity levels. It virtually does away with downdrafts near windows.

FACT No. 4

Twindow is designed to prevent fogging or condensation on the glass

Except under extreme conditions, its sealed-in air space assures window transparency in any climate. This makes Twindow a "must" wherever clear vision is important . . . picture windows for homes, store front display windows, large windows in office buildings, factories, and institutions.

FACT No. 5

Twindow can be handled, installed and cleaned as simply as a single pane of glass

It is a one-piece window unit, completely prefabricated.

We regret that current production is not meeting demands. Deliveries must continue slow until new facilities are completed. When planning new construction or modernization, we suggest you get in touch with our nearest branch to determine if our delivery schedule will permit your use of this finest of insulated windows.

"PITTSBURGH" stands for Quality Glass and Paint

PITTSBURGH PLATE GLASS COMPANY

Pittsburgh Plate Glass Company
2396-6 Grant Building, Pittsburgh 19, Pa.

Please send me, without obligation, complete facts about TWINDOW, the window with built-in insulation.

Name_____

Address_____

City_____ State_____

Carefully Balanced Century Motors

Century 3 horsepower squirrel cage motor driving a grinder.

Help Maintain Closer Tolerances

The unusual freedom from vibration of Century Motors means that the accuracy of your Century powered machines is protected. You get all the precision your equipment is designed to give. Production rejects are fewer.

Century motors maintain their smooth starting and running qualities throughout a long life of satisfactory service, because they are ruggedly built to withstand the toughest kind of service.

Century's wide range of types and sizes from 1/6 to 400 horsepower enables you to select the correct standard Century motor for your application — without sacrificing the qualities necessary to the operation of your equipment. Specify Century on all your electrically powered equipment.

Century C MOTORS

CENTURY ELECTRIC COMPANY

1806 Pine St. • St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

432

A MODERN . . . AND PROVED . . . PROTECTION AGAINST CORROSION

● You can . . . on numerous installations throughout your plant . . . with Fedelco Liquid Plastic Coating. It's a remarkable surfacing material composed of the most inert thermoplastic resins, designed to effectively combat corrosion year after year under the toughest conditions.

Developed by Fedelco Engineers in 1939 especially to meet the challenge of corrosion, the amazing features of Fedelco Liquid Plastic Coating . . . resistance to mineral acids and alkalies or their salts, dielectric qualities, opposition to vapor permeability and non-contaminating features . . . provide practically permanent protection from corrosion.

Fedelco Liquid Plastic Coating is tough . . . yet flexible enough to contract and expand under cold and heat without cracking. It is abrasion resistant. It will not chip. It will not ignite, when thoroughly dry.

Fedelco Liquid Plastic Coating adheres to metal, wood concrete. Surfaces require minimum cleaning. Just remo surface greases and scale. Impermeability of the coating completed . . . through evaporation of solvents . . . in t presence of heat, air and moisture.

In developing this remarkable new corrosion-preventi coating, Fedelco Engineers have made a thorough study your corrosion problems. Let them discuss it with you. Th can quickly explain how completely . . . how easily . how economically your corrosion problems can be solv with Fedelco Liquid Plastic Coating. It's not a "substitu for paint. It's a modern and proved protection agai corrosion.

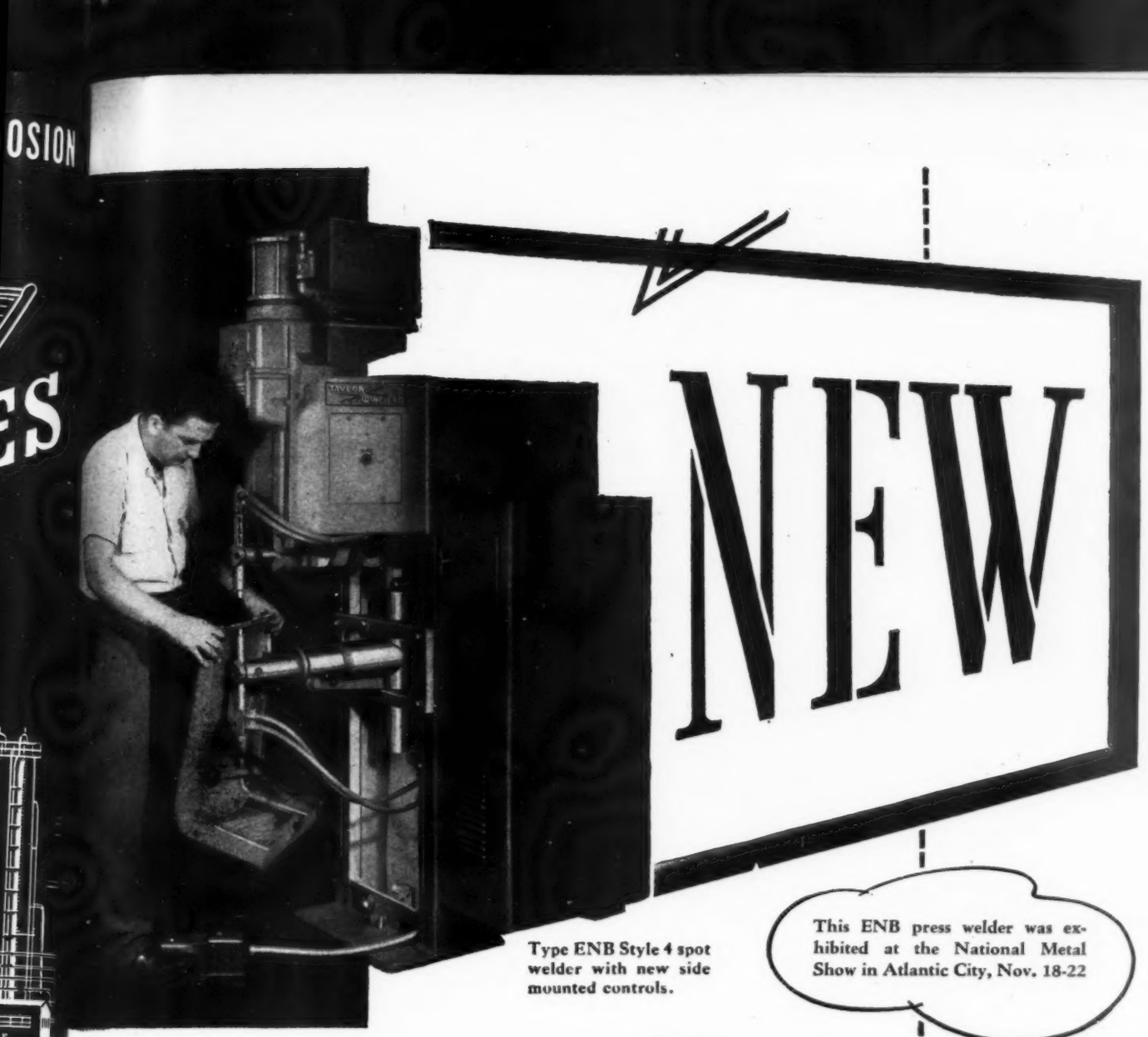
Setting The Pace
In Plastic Coating
To Conquer
Industrial Corrosion

FEDERAL ELECTRIC COMPANY Inc.

PLASTIC DIVISION

225 North Michigan Avenue CHICAGO, ILL. 914 South Wabash

700 Waugh Drive
405 Velasco Street 2114 Main Street JENNINGS, LA. 1701 Grand Avenue 730 St. Charles St.
HOUSTON, TEXAS DALLAS, TEXAS VALLEY CENTER, KAN. KANSAS CITY, MO. NEW ORLEANS, LA



NEW

Type ENB Style 4 spot welder with new side mounted controls.

This ENB press welder was exhibited at the National Metal Show in Atlantic City, Nov. 18-22

TAYLOR-WINFIELD ANNOUNCES NEW TYPE *ENB* AIR OPERATED PRESS WELDERS

These welders are available in two styles. Style 1 is either a projection welder or a combination projection and spot welder when horns are used. The style 4 is a spot welder with a swiveling lower horn.

The projection welder is supplied in throat depths ranging from 12 to 30 inches and the spot welder from 18 to 36 inches. Electrical ratings are 30, 50, or 75 KVA.

These new press welders are built to present day requirements for rugged and precise resistance welding. They are designed and tested for long life and low maintenance costs.

FEATURES

- ✓ Roller Anti-Friction welding head.
- ✓ Bellows Air Lock.
- ✓ Provision for use of side mounted electrical controls.
- ✓ Transformer design of "damage resisting" construction.
- ✓ Air valves mounted adjacent to air cylinders—gives low air consumption and high operating speeds.
- ✓ Tap switches connected to transformer without flexing primary leads.
- ✓ Composite copper-steel knee construction of Style 1 welders insures highest rigidity.
- ✓ Rigidly supported swiveling lower horn of Style 4 welders provides maximum flexibility.

Write for the new Taylor-Winfield ENB Bulletin 3-113. Contains 8 pages of useful information, specifications, descriptions and illustrations. Send for your copy today.

The **TAYLOR-WINFIELD**
CORPORATION
WARREN . . . OHIO

TAYLOR-WINFIELD RESISTANCE WELDERS

USE INVINCIBLE VACUUM CLEANERS!

Only in a clean plant is maximum productivity possible. To eliminate industrial dust, dirt, and litter *better, faster and at less cost,* use Invincible Vacuum Cleaners. Here's why:

THOROUGH CLEANING is assured because Invincibles are heavy-duty machines specifically designed for industry. Multi-stage turbines produce powerful vacuum. These units clean not only floors, but walls, ceilings, beams, bins, machinery, etc.—*all* the dirt from *everywhere.*

FASTER CLEANING obviously results when Invincible machines replace manual methods. Light and readily portable, they can be operated readily by one man. Production is never interfered with. Skilled help is unnecessary.

CHEAPER CLEANING, that quickly repays their cost, occurs when Invincibles replace manual methods. Many tests in different plants have shown that Invincibles collect a greater volume of dirt in less time, and hence produce substantial savings in labor costs. As a "bonus" production rates and employee morale are usually increased.

Model 460, a versatile 1½ H.P. unit.

★

← **FREE** BOOKLET

tells all about Invincible Machines for industry. Write for it!

INVINCIBLE VACUUM CLEANER MFG. CO.

DOVER, OHIO

FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

VISIT OUR BOOTH 201 & 210, JAN. 14 thru 17, NATIONAL MATERIALS HANDLING EXPOSITION

L-S FORK TRUCKS

PAY BIG DIVIDENDS RIGHT HERE

L-S FORK TRUCKS TAKE LESS AISLE WIDTH

L-S Fork Trucks "Pivot on a Platter" — right-angle pile in ONE continuous turn . . . Their low center of gravity and shorter turning radius give us Maximum Maneuverability . . . and that's what counts!

4000 LBS.
3000 LBS.
2000 LBS.
CAPACITIES

MAXIMUM MANEUVER-ABILITY

Shorter turning radius, lower center of gravity and a score of mechanical superiorities make L-S Fork Trucks the last word in efficient handling and storage. Maximum Maneuver-ability means you can right-angle pile in one quarter turn. No backing or filling. No waste aisle space with L-S Fork Trucks!

Write for latest data today!

"L-S Fork Trucks Pivot on a Platter"

Maximum Maneuver-ability Pays Big Dividends in Space, Time and Money

TRADE MARK MULTIPLY MANPOWER LEWIS-SHEPARD

THE TRUCK THAT SAVES YOU AISLE SPACE

LEWIS-SHEPARD PRODUCTS INC.

314 WALNUT ST., WATERTOWN 72, MASS.

REPRESENTATIVES IN PRINCIPAL CITIES (Lewis-Shepard) CONSULT YOUR PHONE DIRECTORY

SINGLELIFTS • HYDRAULIC HANDLIFT TRUCKS • JACKLIFTS • SKIDS • PALLETS • PALLET TRUCKS • STACKERS
PALLET STACKERS • PRODUCTION LIFTERS • CRANES • RACKS • FLOOR TRUCKS
ELECTRIC, GAS-ELECTRIC AND GASOLINE POWERED FORK TRUCKS

ask Nutting ENGINEERS

FOR ADVICE ON MATERIALS HANDLING

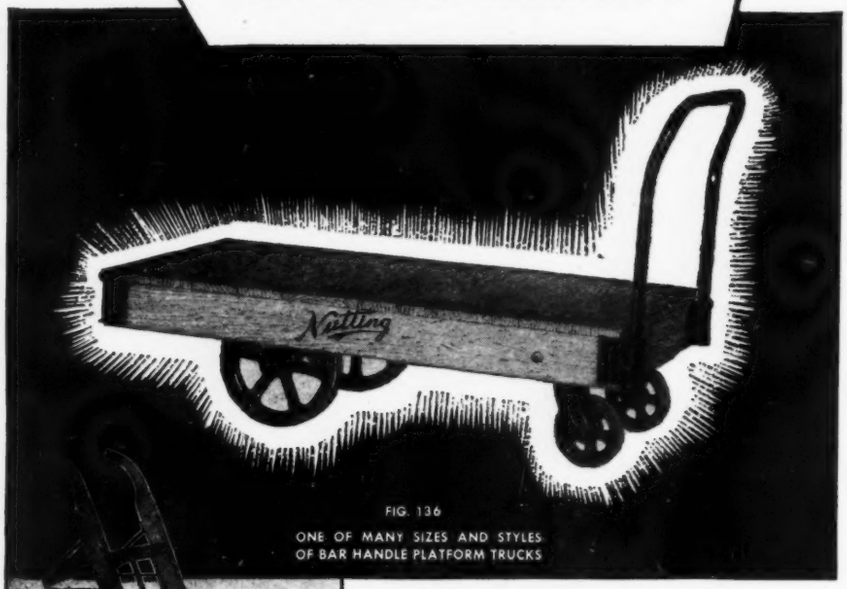


FIG. 136
ONE OF MANY SIZES AND STYLES OF BAR HANDLE PLATFORM TRUCKS

FIG. 16-24 TWO-WHEEL TRUCKS FOR EVERY USE

FIG. 419-421 JACK AND LIVE SKID

CASTERS, ALL TYPES, LIGHT, MEDIUM, HEAVY DUTY

WHEELS WITH DEMOUNTABLE RUBBER TIRES

NOW Is the Time to Engineer Your Materials Handling

Your materials handling system needs to be just as carefully planned and engineered as your production set-up, or the design of your products. A planned layout may well be the difference between profit and loss, between smooth-flowing operation and a time-wasting series of bottlenecks. Take advantage of the seasoned experience and valuable advice of a Nutting Engineer. Because the all-around adaptability and versatility of Nutting Trucks have never been excelled, he can advise you on the proper use of trucks with overhead or floor conveyors . . . assembly or production line use . . . inter-departmental use . . . warehouse or shipping room use . . . as well as situations where only trucks should be used.

Over 1000 Nutting Designs

55 years of specialized, continuous experience in building materials handling equipment is embodied in the Nutting line for your benefit. We supply every need in floor trucks, casters, wheels—including specially designed trucks for specific needs.

LOOK in Your Classified Telephone Directory

to contact your nearest Nutting Sales Engineer, or write to us direct. Ask for Bulletin 41-G.

SEE NUTTING EXHIBIT, NATIONAL MATERIALS HANDLING EXPOSITION, CLEVELAND, JANUARY 14-17

our 55th Year

NUTTING TRUCK and CASTER COMPANY

1413 DIVISION ST., FARIBAULT, MINNESOTA

Meeting, Statler Hotel, Cleveland. A. V. Hutchinson, Secretary, 51 Madison Ave., New York 10.

27-31, Electrical Engineering Exposition, 71st Regiment Armory, New York. Charles F. Roth, President, International Exposition Company, Grand Central Palace, New York 17.

27-31, American Institute of Electrical Engineers, Annual Winter Meeting, Engineering Societies Building, New York. H. H. Henline, Secretary, 33 West 39th St., New York 18.

FEBRUARY

24-26, American Management Association, Personnel Conference, Palmer House, Chicago. James O. Rice, Conference Manager, 330 West 42nd St., New York 18.

24-28, American Society for Testing Materials, Spring Meeting, Benjamin Franklin Hotel, Philadelphia. Robert J. Painter, Assistant Secretary, 1916 Race St., Philadelphia 3.

MARCH

2-5, American Society of Mechanical Engineers, Spring Meeting, Mayo Hotel, Tulsa, Okla. Ernest Hartford, Executive Assistant Secretary, 29 West 39th St., New York.

17-19, American Society of Lubrication Engineers, National Convention, William Penn Hotel, Pittsburgh. B. H. Jennings, Secretary-Treasurer, Northwestern Technological Institute, Evanston, Ill.

17-19, Chicago Technical Societies Council, Inc., Production Show and Conference, Stevens Hotel, Chicago. Paul A. Jenkins, Executive Secretary, 53 West Jackson Blvd., Chicago 4.

17-21, American Institute of Mining Engineers, Annual Meeting, Waldorf-Astoria, New York. Harry Maloney, Assistant Treasurer, 29 West 39th St., New York.

19-22, American Society of Tool Engineers, Annual Meeting, Rice Hotel, Houston. Harry E. Conrad, Executive Secretary, 1666 Penobscot Bldg., Detroit 26.

21-22, The Society for the Advancement of Management, Inc., Spring Conference, Los Angeles. Carl S. Coler, Executive Director, 84 William St., New York 7.

22-27, American Society for Metals, Western Metal Congress and Exposition, Oakland Civic Auditoriums, Oakland, Calif. W. H. Eisenman, Managing Director, 7301 Euclid Ave., Cleveland 3.

25-28, Safety Engineers, Annual Convention, Hotel Pennsylvania, New York. Paul F. Stricker, Executive Vice-President, Greater New York Safety Council, Inc., 60 East 42nd St., New York 17.

31-Apr. 2, Midwest Power Conference, Annual Meeting, Palmer House, Chicago. Stanton E. Winston, Conference Director, Illinois Institute of Technology, 3300 Federal St., Chicago.

STRETCH YOUR WAREHOUSE

If you, like so many others today, are cramped for warehouse space, it's time you learned about SUPERSTRONGS.

SUPERSTRONG boxes—"Bound with Steel"—come to you in flat form, so that they occupy less than one-sixth of the space normally required. The resultant saving provides that warehouse space you need so badly—and just can't find.

Let us tell you how SUPERSTRONGS can more effectively handle your future requirements.

SHIPPING TRADE SUPERSTRONG MARK CONTAINERS
REG. U.S. PAT. OFF.

RATHBORNE, HAIR AND RIDGWAY COMPANY
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

A *Special* FABRIC

might solve your problem

Cloth Bound

A cloth bound book is bound to be kept — bind your CATALOG — SALES MANUAL — INSTRUCTION BOOK, ETC. in HOLLISTON Book Cloth — durable, impressive, hard-to-soil, easy-to-clean.

Write for samples.
Consult your printer.

SPECIAL FINISH

HOLLISTON special finish cloths meet special needs — TRACING CLOTH — PHOTO CLOTH — RUBBER (PROCESSING) CLOTH — BOOK CLOTH — SHADE CLOTH — SIGN CLOTH — TAG CLOTH.

Cloth combined with special compounds, filled, impregnated, coated — to form a material with characteristics of a plastic and the flexible strength of a woven fabric.

HOLLISTON Special Purpose Fabrics can be produced with almost any wanted properties: they can be made waterproof and resistant to certain solvents, acids and alkalis, or made to withstand moderately high temperatures; their dielectric characteristics can be tailored to your requirements. The wide range of tensile strength, stiffness, tear strength and caliper makes them ideally suited to a lot of very unusual manufacturing and industrial applications. And new uses are constantly being found. Perhaps your problem is another new use for a HOLLISTON Special Purpose Fabric — write our Research Department, we'll gladly co-operate.

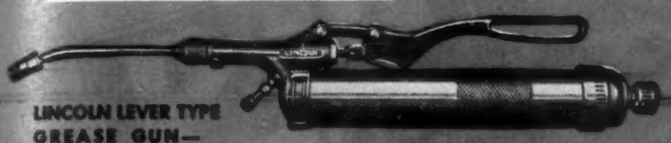
By filling, impregnating or coating various fabrics (from sheer cambric to coarse burlap) with plastics, resins, starch and pyroxylin we can produce a cloth with almost any wanted properties.

HOLLISTON

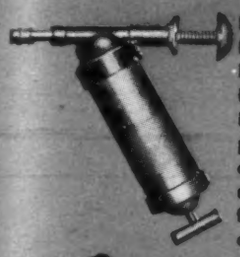
Special Purpose Fabrics

THE HOLLISTON MILLS, INC., NORWOOD, MASSACHUSETTS

REDUCE *Production Losses*



LINCOLN LEVER TYPE GREASE GUN—
A heavy-duty grease gun that develops 10,000-lbs. pressure. Has 17-ounce capacity.

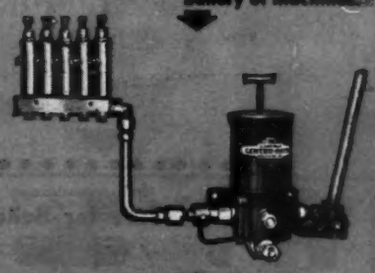


LINCOLN 400-LB. HEAVY-DUTY DRUM PUMPS — Pump lubricants, sealing compounds, insulating compounds, putty and other viscous materials direct from original containers.

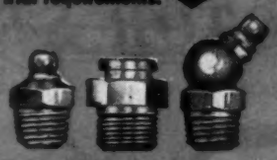
LINCOLN PUSH-TYPE GREASE GUNS—
Available in 9 and 15-ounce capacities.

LINCOLN HIGH-PRESSURE BUCKET PUMPS—30-lb. capacity high-pressure grease guns. Manually operated. Portable.

LINCOLN CENTRO-MATIC LUBRICATING SYSTEMS—Consist of a Lincoln Lubricant Pump connected to a series of injectors, (one for each bearing), through a single supply line. Pump can be hand-operated or power-operated with time clock or push-button control. These systems can be installed to supply a single machine or a battery of machines.



LINCOLN GREASE FITTINGS—All sizes—All types. A complete line for all industrial requirements.



LINCOLN 100-LB. HEAVY-DUTY DRUM PUMPS—Same features as 400-lb. unit.

CAUSED BY... FAULTY LUBRICATION

Steadily mounting production costs due to higher priced raw materials and increased payrolls is a problem that management must overcome if profits are to be maintained.

Every maintenance superintendent can help increase the service life and output of machinery, and cut maintenance cost, by positive, thorough lubrication.

Lincoln provides the proper Lubricating System for every application. The line is complete and includes everything needed for efficient lubrication maintenance. A few of the many items are illustrated.

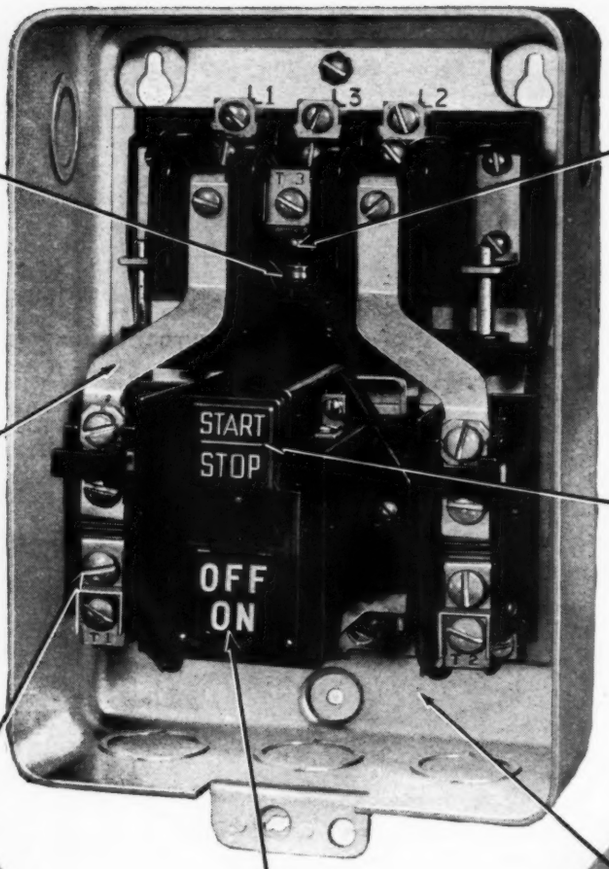
Ask Your
LINCOLN
WHOLESALER!

LINCOLN 846-20

Pioneer Builders of Engineered Lubricating Equipment

LINCOLN ENGINEERING COMPANY
5701 NATURAL BRIDGE AVE., ST. LOUIS 20, MO., U. S. A.

How's THIS for a Starter?



MOVING CONTACTS (Double-Face)

STATIONARY CONTACTS (All Removable from Front)

JUMPERS (Added Rigidity)

SINGLE BUTTON START AND STOP

HEATERS FOR THERMAL OVERLOADS (Easily Accessible)

SIGNAL FLAG ON-OFF

AMPLE WIRING ROOM

Write for bulletin 200

MASTER A.C., across-the-line, magnetic MOTOR STARTER

THE MASTER ELECTRIC CO. MASTER **DAYTON 1, OHIO**

COPYRIGHT 1946 THE MASTER ELECTRIC CO

P&H ZIP-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.

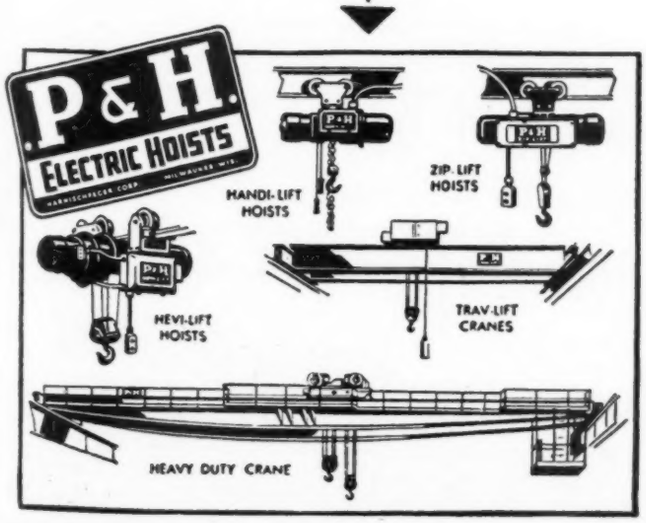
STORAGE IS NO PROBLEM

when you move parts "THRU-THE-AIR"

In and out . . . up and down . . . on and off of shelves. Only with "Thru-the-Air" handling can you make *all* these moves with a minimum of time, effort and floor space.

A minimum of time because your loads move *direct* —without rehandling. A minimum of effort because electric power does all the work—the operator merely pushes buttons. A minimum of floor space because loads move "Thru-the-Air," without congesting aisles.

In the P&H Zip-Lift, a modern wire rope electric hoist, you get all the advantages of "Thru-the-Air" handling at a price soon repaid out of savings. Use it on hook, jib, or trolley—just hang it up, and the Zip-Lift is ready to go! For free details, ask for Bulletin H20-1.



HARNISCHFEGER CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

4525 W. National Ave., Milwaukee 14, Wisconsin

Speeding Materials Flow at Alcoa

DAY IN, DAY OUT, the fast and versatile Crescent Electric PALLETIER speeds a multitude of palletized materials through Aluminum Company of America's North Plant in Alcoa, Tennessee. Wide varieties of boxes and crates, piles of lumber and numerous other items are lifted, hauled and stacked high above the floor . . . easily, safely and at low cost. One operator does the entire job with fingertip control.

Compact, maneuverable, packed with power, the Crescent Electric PALLETIER can slip through narrow areas, negotiate steep ramps, shrink loading and unloading time, curtail manpower requirements.

In the food, textile, chemical and metalworking industries—wherever it is in use, the PALLETIER has proven to be an effective way to step-up materials handling and cut costs.

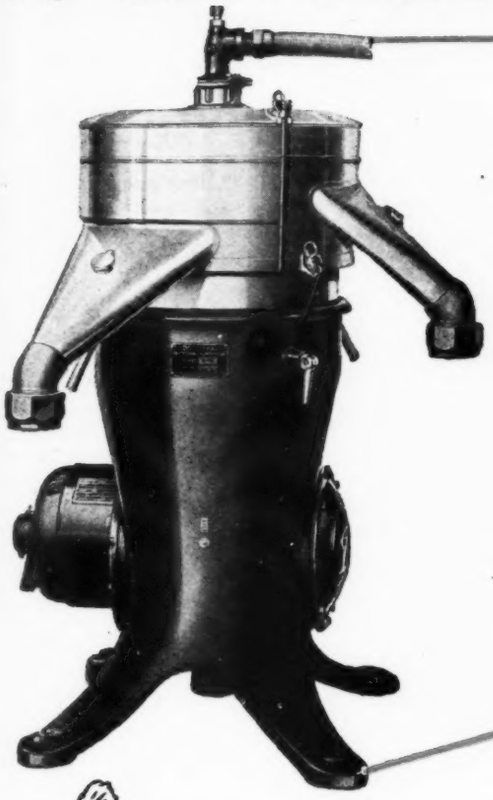
There's a place in your plant for the Crescent PALLETIER—available in 1, 2, 3, 4 and 6000-pound capacities. Write for descriptive literature today.

CRESCENT TRUCK COMPANY
1100 Willow St., Lebanon, Pa.

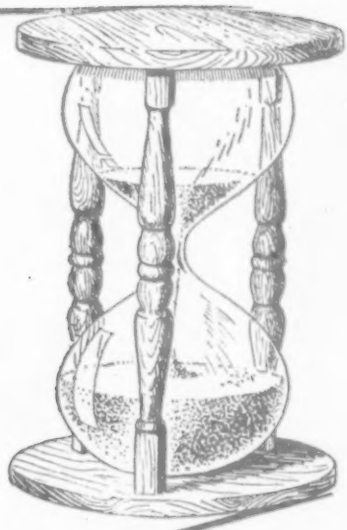
Industrial Truck and Tractor Specialists Since 1917

CRESCENT *Electric* PALLETIER

A Continuous Separator



DOES MORE THAN SAVE Time!



TRUE, De Laval Industrial Separators and Purifiers save production time by making many processes continuous. For instance, factory oils of all kinds—lubricating oil, cutting oil, grinding coolant, hydraulic oils and many others may be continuously purified and returned to service. Removal of dirt, metallic particles and water from these factory oils restores them to full efficiency ***quickly***.

But speeding up production is only ***one*** phase of the work of De Laval centrifugals. Almost invariably it delivers a ***better product***. Centrifugal force effects such ***complete*** separation, or such complete purification, that a definite product improvement can often be noted.

In addition, De Laval Separators and Purifiers frequently make possible important savings in the liquids being processed for there is no waste when centrifugal force is the agent.

Write for additional details—mention what liquids you wish to separate or clarify.

DE LAVAL

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 19
THE DE LAVAL COMPANY, Limited
MONTREAL PETERBOROUGH WINNIPEG VANCOUVER

PURIFIERS AND CLARIFIERS FOR FACTORY OILS

REZNOR

THE AUTOMATIC GAS HEATER *with the* •••

Big! Quiet! **FAN**

Reznor space heaters located at ceiling height or floor level and **fired by gas,** operate with automatic control. The big fan plus directional louvres direct abundance of warm air **where** you want it and only **when** you want it. Commercial establishments and buildings of all types, factories and warehouses, offices and homes use these attractive Reznor heaters for comfort, cleanliness, and economy. Write for further data.

REZNOR

Gas fired unit heaters

SUSPENDED OR FLOOR MODEL

A SIZE FOR EVERY NEED

REZNOR CO.
MERCER, PENNA.
GAS HEATERS SINCE 1888

NO BOILERS • NO STEAM LINES
NO FUEL STORAGE • NO FIRE TENDING

factory's catalog service

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY

USE THE COUPON TO GET MANUFACTURERS' LITERATURE

1

ALLOY STEELS—"2 Steels Simplify Your Alloy Needs" is the title of 10-page text on No. 5-317 and No. 158 chrome-nickel alloy steels. Provides description, data on properties, sizes, tolerances, and instructions for working. The Carpenter Steel Co.

2

ARC WELDER—Heavy-duty a.c. arc welder (300-amp. capacity) is featured in 4-page Form No. 101. Lists characteristics, power draw, and price. Picture of the unit is included. Smith Welding Equipment Corp.

3

AUTOMATIC PROPORTIONING EQUIPMENT—and methods in continuous process operation are treated in 28-page Bulletin 1200. Photographs of the units and typical installations are supplemented by flow diagrams and detail drawings. % Proportioneers, Inc. %

4

CALENDAR—A 12x20-in. 1947 weekly wall catalog calendar features a different standard item, such as tracing paper, ruling pens, drafting machines, and furniture, on each of the 52 pages. The Frederick Post Co.

5

CENTRIFUGAL BLOWERS AND EXHAUSTERS—are displayed in 8-page Bulletin 120-B-13, showing applications of the single- and multi-stage types with capacities up to 100,000 c.f.m. Roots-Connersville Blower Corp.

6

CITY FACILITIES—Pocket-sized booklet, 40 pages, entitled "Facts in Figures about Atlanta" discusses transportation and communication facilities, location, agriculture, industries, population, characteristics, public utilities, trade, housing, finance, and other data. The Industrial Bureau, Atlanta Chamber of Commerce.

7

CLAMPS—Duo-Square work holding clamps are set forth in 4-page circular illustrating how they are used. Specifications and prices are included. McFerron-Myers Products Co.

8

CLEANING POWDER—for floors, building exteriors, equipment, glass, ceramic tile, aluminum, and other surfaces, is presented in 6-page folder. Illustrations show uses, and special features of the product are discussed. American Oil & Disinfectant Corp.

9

COLOR CONDITIONING—A plan for the use of color designed to improve production and increase employee efficiency in the plant is introduced in 32-page

MAILING COUPON—GOOD UNTIL FEBRUARY 28, 1947, ONLY

FACTORY MANAGEMENT & MAINTENANCE (December, 1946)
330 West 42nd Street, New York 18

Please have manufacturers send me, without obligation, literature below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72	73	74	75	76				

Name ..... Title .....

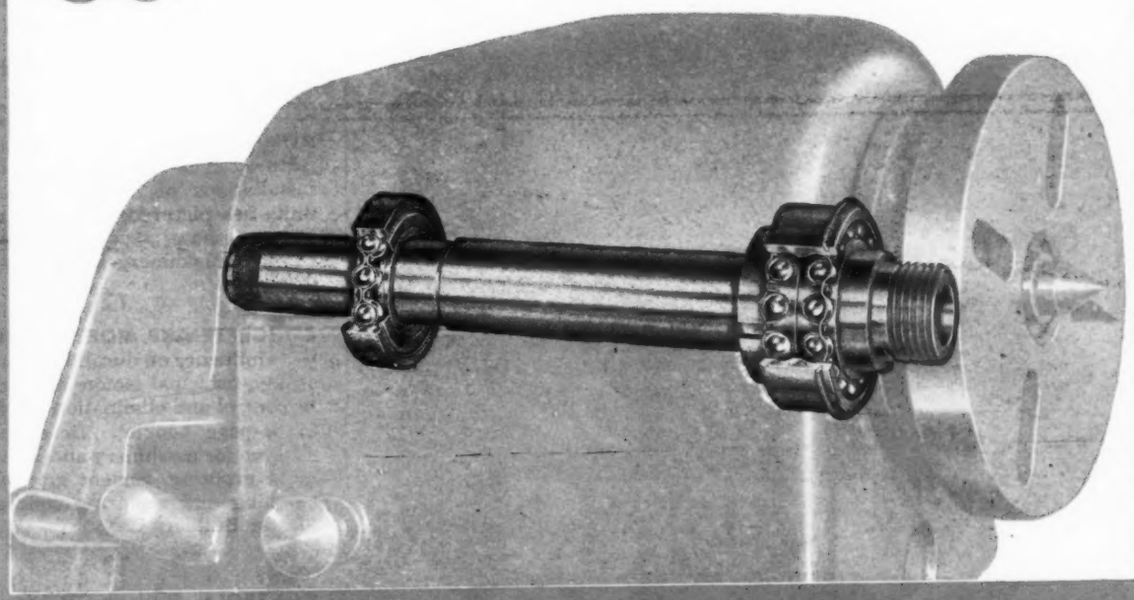
Company .....

Street Address .....

City ..... State .....

Please fill out this coupon completely in order to avoid delay in handling. (Numbers correspond to description paragraph numbers.)

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



BALL BEARING
SPINDLE MOUNTING

permits higher cutting speeds,
requires no bearing adjustment...
sustains accuracy of LOGAN Lathes

Quick Change Gear
Cabinet Turret Lathe

SPECIFICATIONS COMMON TO ALL LOGAN LATHES . . . swing over bed, 10½" . . . bed length, 43⅛" . . . size of hole through spindle, 25/32" . . . spindle nose diameter and threads per inch, 1½"—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision-ground ways, 2 V-ways and 2 flat ways.

With its spindle turning on a pre-loaded ball bearing mounting of extreme precision, the Logan Lathe is inherently well adapted to accurate work at higher spindle speeds. This fact permits the Logan Lathe operator to use modern high speed carbide cutting tools to full advantage. It assures a minimum of spindle deflection due to pressure of the cutting tool. It means, too, that no bearing adjustment is required within the full range of the Logan spindle speeds, 30 to 1450 rpm. Consequently, the accurate factory alignment of the Logan spindle is not disturbed by periodic bearing adjustments, and original accuracy is sustained. Grease sealed, the Logan Ball Bearing Spindle never needs lubrication. All these characteristics of the Logan Ball Bearing Spindle Mounting are important factors in the proved ability of Logan Lathes to increase output and decrease costs on production lines, and to do faster, more accurate cutting jobs in the tool room. For full information, see your nearest Logan Lathe dealer, or write direct for the Logan Lathe catalog.

M-1

LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

How to relieve congestion in warehouse and plant...

Rely On
ROSS

FOR THE ECONOMIES OF OUTDOOR STORAGE!

Take advantage of the unmatched ability of ROSS Straddle Carriers and Lift Trucks to handle heavy loads—up to 30,000 pounds—on rough ground, mud or snow. These rugged machines will enable you to store your materials out-of-doors—where space is cheaper and less restricted—and help you lick the problem of congestion in warehouse and plant... The complete facts about how The ROSS System of Straddle Carriers and Lift Trucks cuts handling costs all along the line will convince you—send for ROSS BOOK F-126.

THE ROSS CARRIER COMPANY
295 MILLER STREET, BENTON HARBOR, MICHIGAN, U. S. A.
DIRECT FACTORY BRANCHES AND DISTRIBUTORS THROUGHOUT THE WORLD

booklet. A "Three-Dimensional Seeing" treatment of machines is depicted with photographs of installations, and the Safety Color Code for Industry is outlined and discussed. E. I. du Pont de Nemours & Co., Inc.

10

COMPENSATORS—for general pipeline installations are introduced in Bulletin COM-1. Contains data on specifications, installation, working pressures, standard end fittings, and conditions affecting piping. Chicago Metal Hose Corp.

11

COMPRESSORS—for heavy-duty use are featured in 32-page Bulletin L-680-B1A. Installations of opposed steam-driven units are pictured, and sectional illustrations show structure. Worthington Pump & Machinery Corp.

12

CONCRETE AND MORTAR SHRINKAGE—its influence on durability and serviceability, principal factors affecting it, and its control and elimination are explained in 34-page booklet. Describes use of Embeco for machinery and heavy equipment grouting, cement gun work, and patching and repairing concrete. The Master Builders Co.

13

CONTROLS—Bulletin CP-1 is a consolidated price list superseding all other prices printed in manufacturer's bulletins on single-pump Tanktrols, multi-pump control, 2- or 3-wire pilot circuit Protectrols, single- and multi-pump Mototrols and Duotrols, float switches, auxiliary controls, and accessories. Automatic Control Co.

14

CRANE CONTROL—Bulletin 930 describes frequency relay magnetic control for a.c. wound-rotor, motor-operated cranes. Contains tables on ratings and dimensions, performance curves, and photographs. The Electric Controller & Mfg. Co.

15

CUTTING TOOLS—Illustrated leaflet is devoted to two types of cutting tools, Model No. 2 for pliable materials, and No. 3 for soft rubber and plastics. The different parts are indicated in detailed sketches, and applications as well as sizes are discussed. Zimmerman Packing Co.

16

DRIVES—for motorizing machine tool equipment are featured in 8-page publication. Photographs illustrate installations. Industrial Equipment Div., The Master Electric Co.

17

ELECTRIC CABLE HOISTS—Details of features, and tables of specifications and prices of Bob-Cat electric cable hoists are set forth in 8-page text. Cross-sections show parts, and dimensional

Pound 'em. Drag 'em. Smear 'em with grease and oils. Douse 'em with water, acids, or alkalies. Watch Flamenol cords take the tough treatment so often encountered where portable tools are used—and see for yourself what long service they offer.

The secret of this ability to stand severe conditions lies in the Flamenol cord's specially compounded thermoplastic insulation, plus construction that provides extreme flexibility, lightweight, and high mechanical strength. The result is a *combination* of properties never before available in *one type* of cord.

Cut costs—Stop trouble

Here are two easy ways to guard your portable tools against costly stoppages due to power-supply cord failure:

(1) Be sure that the tools you buy are equipped with Flamenol cords.

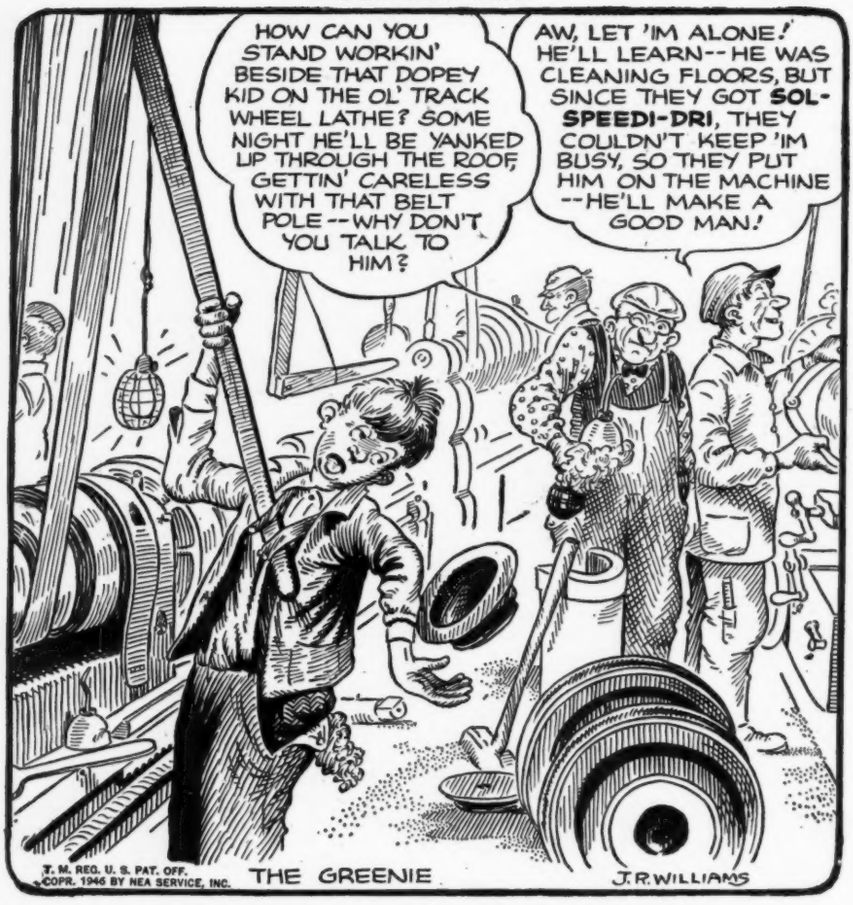
(2) Always use Flamenol cords for replacement on your equipment.

Flamenol portable cords are available in a number of types and capacities to meet requirements of a wide range of applications. Your G-E Merchandise Distributor will gladly give you full details regarding the use of Flamenol cords with your equipment. For information, write to Section W21-1237, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Conn.

*Trade-mark Reg. U.S. Pat. Off.

GENERAL ELECTRIC

OUT OUR WAY


HOW CAN YOU STAND WORKIN' BESIDE THAT DOPEY KID ON THE OL' TRACK WHEEL LATHE? SOME NIGHT HE'LL BE YANKED UP THROUGH THE ROOF, GETTIN' CARELESS WITH THAT BELT POLE--WHY DON'T YOU TALK TO HIM?
AW, LET 'IM ALONE! HE'LL LEARN--HE WAS CLEANING FLOORS, BUT SINCE THEY GOT SOL-SPEEDI-DRI, THEY COULDN'T KEEP 'IM BUSY, SO THEY PUT HIM ON THE MACHINE --HE'LL MAKE A GOOD MAN!
T. M. REG. U. S. PAT. OFF. COPR. 1946 BY NEA SERVICE, INC.
THE GREENIE
J.R.WILLIAMS

SOL-SPEEDI-DRI SAVES MANPOWER

THAT'S RIGHT! SOL-SPEEDI-DRI . . . the white, granular oil- and grease-absorbent . . . makes floor-maintenance a one-man job. Just spread it around . . . and immediately, you've got a carpet of safety underfoot . . . safe for walking, safe for working. Sweep it up . . . and SOL-SPEEDI-DRI brings with it dangerous, unsightly oil- and grease-deposits . . . making floors home-clean.

No complicated machinery . . . no trained personnel . . . is required to use SOL-SPEEDI-DRI. It's economy-wise . . . because it releases cleaning-personnel for more productive jobs. It's production-wise . . . because it keeps men on the job . . . free from the hazards of oil-slick floors. In addition, SOL-SPEEDI-DRI reduces the danger of fast-spreading flash-fires. It will not readily burn . . . even when completely oil-soaked!

SUPPLIERS:— *East: Safety and Maintenance Co., Inc., New York 1, N. Y.*
South, Midwest, and West: Waverly Petroleum Products Co., Philadelphia 6, Pa.

SOL·SPEEDI·DRI
OIL AND GREASE ABSORBENT
UL
Get the full story of SOL-SPEEDI-DRI, today. Write SOL-SPEEDI-DRI across your letterhead or business card and mail for complete details and a free, generous sample.

sketches of mountings are given. Lisbon Hoist & Crane Co.

18

ELECTRIC CONTROLS—Eight-page Bulletin No. 100,000 contains information and illustrations of a.c. and d.c. motor starters, speed and voltage regulators, resistors, rheostats, switches, magnetic contractors, relays, and dimmers. Ward Leonard Electric Co.

19

ELECTRIC GENERATOR PLANTS—for operating tools, concrete vibration, and other uses, are pictorially presented in 6-page form. Outlines tools and equipment for use with the units, known as Big-3. Industrial Equipment Div., The Master Electric Co.

20

FABRICATED STEEL PRODUCTS—including shelving, lockers, office equipment, ventilating unit, and other items, are outlined in 8-page form. The different items are illustrated with photographs and drawings. Berger Mfg. Div., Republic Steel Corp.

21

FANS AND DUST COLLECTORS—Illustrated 20-page Catalog 200 describes draft-producing and dust-collecting equipment. Gives details on specific installation problems. Prat Daniel Corp., through The Thermix Engineering Co.

22

FIXTURE CLAMPS—of 5 types, for holding work, are presented in 5-page Bulletin No. 25. Principal dimensions, accessories are listed, and price list is attached. Photographs display the different types. West Point Mfg. Co.

23

GAS APPLIANCE REGULATORS—with pressure cast aluminum alloy cases, are cataloged in 12-page Bulletin No. 1136. Detailed drawings and cross-sectioned photographs explain design and performance. Technical data on sizes, capacities, and dimensions are tabulated. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co.

24

GEARSHIFT DRIVES—electric motors, pedestal grinders, and polishing and buffing lathes are described in 6-page folder. Explains applications, construction, and other features. Includes pictures and cutaway view. The Lima Electric Motor Co.

25

GENERATORS—and motor generator sets are featured in 8-page Form 646. Contains information and pictures of 50-watt to 200 kilowatt d.c. generators, 500-watt to 150 kilowatt a.c. generators, and a.c. to d.c., d.c. to d.c., d.c. to a.c. motor generator sets. Century Electric Co.

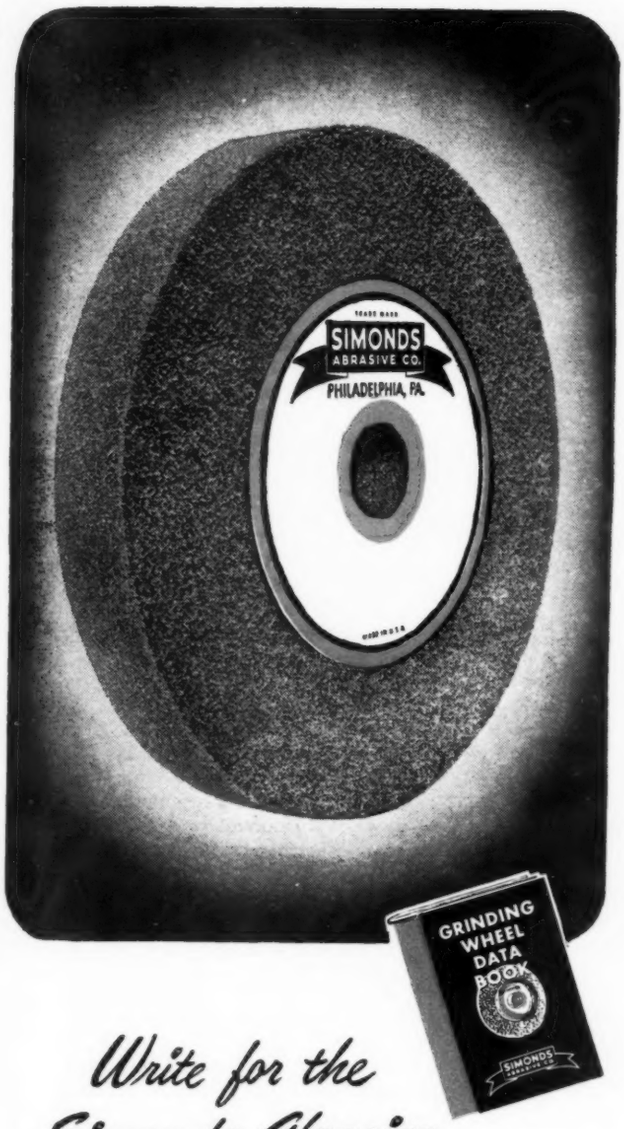
26

GOGGLES—Line of spectacle-type gog-

Rule O' Thumb

may get you

half a wheel



Write for the Simonds Abrasive Data Book

Why wear down and out two or three wheels when one might do the job and do it better? Selecting wheels by guess adds up to too much money for too many wheels; too much cost because of sluggish stock removal, inaccuracies in finishing, and rejected work.

These are facts and are good reasons why there are thousands upon thousands of combinations in grain, size, grade, structure and bond in the complete line of Simonds Abrasive Borolon (aluminum oxide) and Electrolon (silicon carbide) products.

Whether you are working on soft plastics or the hardest metal, with the Simonds Abrasive Data Book you have the means of intelligently selecting the grinding products that will do your jobs better and cheaper.

Borolon and Electrolon Stocks are now restored for prompt supply of your requirements. You will find Simonds Abrasive Distributors ready to help you in your wheel selection and prompt to serve your needs.

SIMONDS ABRASIVE CO.

SIMONDS ABRASIVE CO. *Is a Division of* SIMONDS SAW AND STEEL CO. *Other affiliated companies* SIMONDS STEEL MILLS SIMONDS

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

"Sure you could throw me over... but how'd I get back?"

A FAIR question! For Cyclone Chain Link Fence is not easily evaded. It's a problem to pilferers . . . a protection to plants all over the world.

You get years of trouble-free service with Cyclone. That's assured by its top-quality materials, special design, and expert workmanship . . . plus expert installation by factory-trained crews. What's more, there's a type of Cyclone Fence to fit every requirement.

Write for your free copy of our fact book, "Your Fence", which illustrates and describes the 14 types of U·S·S Cyclone Fence available to meet your needs. Or, if you prefer, our factory-trained engineers will be glad to assist you with your plans and specifications. There's no obligation, of course.

CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Waukegan, Ill. · *Branches in Principal Cities*
United States Steel Export Company, New York

U·S·S CYCLONE FENCE

CYCLONE FENCE DIVISION · American Steel & Wire Co. · UNITED STATES STEEL
USS CYCLONE FENCE

Clip this coupon—and send it to:
Cyclone Fence, Waukegan, Ill., DEPT. 9126
We'll send you our free, 32-page book on fence. It's full of facts, specifications, illustrations. Shows 14 types of fence. Before you choose any fence for your property, get the facts about Cyclone.
Name.....
Address.....
City..... State.....
Interested in fencing: ☐ Industrial; ☐ School; ☐ Playground; ☐ Residence. Approximately.....feet.

UNITED STATES STEEL

gles, known as Specti-Goggles, is the subject of 4-page Catalog Section No. AWP-50. Pictures eight basic designs, and lists different types of lens, side-shield, and frame combinations available. Supplementary price list is given. Eastern Equipment Co.

27

GRINDING MACHINES AND TOOLS—Eight-page pamphlet is devoted to portable grinding machines and tools. Photographs show applications, and engineering data are supplied. Industrial Equipment Div., The Master Electric Co.

28

HEATING UNITS—Chromalox heating units and equipment are described, and engineering data on electric heat are compiled in 64-page Catalog 42. Procedure for calculating heat requirements is described, as well as selection of proper heaters, and installation and wiring diagrams are included. Edwin L. Wiegand Co.

29

HOUSE ORGAN—"Progress Thru Research," Vol. 1, No. 1, is a quarterly publication covering newly developed products, facilities for research, and results of research. Photographically illustrated. Research Laboratories, General Mills, Inc.

30

INDUCTION HEATING—and melting are described in 8-page Bulletin 27. Explains principles, applications, and gives data on selection of equipment. Photographs are used to supplement text. Ajax Electrothermic Corp.

31

INDUSTRIAL MAINTENANCE — Bulletin PE-1946 shows ways to handle industrial and diesel maintenance operations involving removal and replacement of gears, bearings, pinions, pulleys, shafts, and other parts. Illustrates maintenance service sets. Owatonna Tool Co.

32

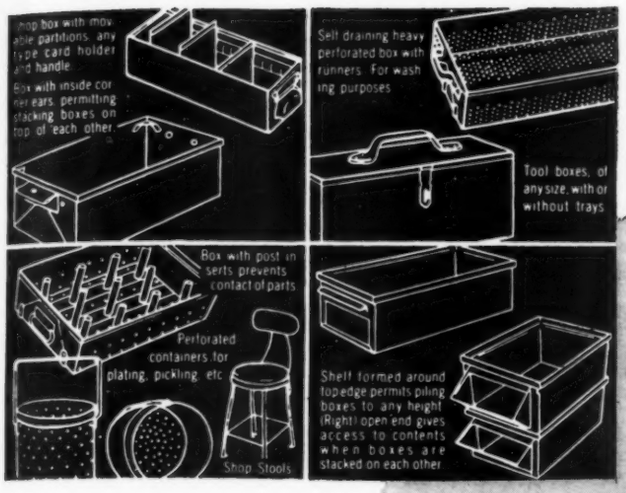
INSULATED WIRE AND CABLE—Bulletin GEA-4352, 16 pages, tells about Flamenol-insulated wire and cable. Outlines steps in manufacturing, and illustrates types and uses. Ratings and specifications are listed. General Electric Co.

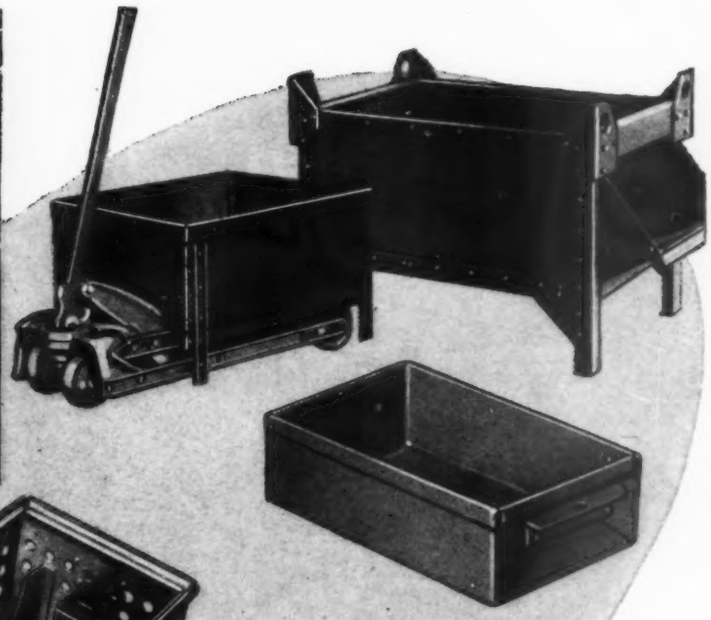
33

INSULATION—Illustrated manual, 20 pages, entitled "Control of Industrial Heat and Power Losses," tells how to select insulating materials for high temperature controls. Discusses use of mineral wool for insulating boilers, hot storage tanks, driers, boiler drum heads, feed water heaters, and other equipment. Industrial Mineral Wool Inst.

34

LIFTING JACKS—Catalog 203, 40 pages, provides descriptions, data, and specifications of line of ratchet, screw, air motor operated, and hydraulic jacks;


Shop box with movable partitions, any type card holder and handle
Box with inside corner ears permitting stacking boxes on top of each other
Self draining heavy perforated box with runners. For washing purposes
Tool boxes, of any size, with or without trays
Box with post inserts prevents contact of parts
Perforated containers for plating, pickling, etc.
Shop Stools
Shelf formed around topedge permits piling boxes to any height (Right) open end gives access to contents when boxes are stacked on each other



Steel Piling Box **with fixed or removable partition designed to hold one set of parts needed for any given assembly or sub-assembly. Big time-saver.**

Stacking or Piling Box **of excellent design, strong and durable. Any size, to suit your needs. Above: Triple Hem Shop Box made with straight or tapered sides**

Shop Barrels, **any style or size, built for long life and hard service.**

TO KEEP PRODUCTION *flowing smoothly*

Where small, loose products are used or produced, perfecting the materials handling system is often the most important factor in attaining lower production cost. An essential part of the system is properly designed, light and strong metal shop containers for the pickup, collection, and conveyance of materials to and from machines, finishing, assembly, packaging and storage.

Cleveland shop boxes, barrels, cans, pans and pails are usually custom-made, because the small extra first cost is trifling compared with the advantages gained, year in and year out, by having containers of exactly the right size, shape and design to fit individual needs and special handling requirements.

Catalog, prices, and design service on request, without cost or obligation.

SHOP EQUIPMENT DIVISION
Cleveland Wire Spring Co.
5250 BROOKPARK RD.• CLEVELAND 9, OHIO

Shop Stools **with steel, solid wood or laminated wood seats. Sturdy reinforced legs, of any desired height.**

Comfortable Back Rests **of several different designs, may be had at a slight extra cost.**

Cleveland **STEEL SHOP EQUIPMENT**

CLEVELAND WIRE SPRING CO.
2012 West 25th Street, Cleveland 13, Ohio
Subsidiary of Reynolds Spring Company, Jackson, Mich.

Are you getting these

HIDDEN PROFITS

in the chain you use?

Savings reflected from use of TAYLOR MADE Alloy chain are hidden profits. With twice the strength of ordinary chain you have fewer production delays. TAYLOR MADE'S longer life means less frequent replacement. Its terrific resistance to shock...grain growth and work hardness eliminates periodic heat-treatments—reduces operating and maintenance costs. Investigate TAYLOR today. Call your Mill supply distributor or write the factory direct.

S.G. TAYLOR CHAIN COMPANY
Dept. F12, Box 509, Hammond, Indiana

TAYLOR MADE *Chain*

"THE BEST BY TEST SINCE 1873."

applications and illustrations are included. The Duff-Norton Mfg. Co.

35

LUBRICATION—Reprint of a talk on "Centralized Lubrication" is presented in 11-page Journal, Vol. 2, No. 2. Traces the history of centralized lubrication and explains systems and devices in current use. The American Society of Lubricating Engineers.

36

MASONRY DRILLS—Bulletin No. 300, 4 pages, gives description, specifications, and prices on standard carbide-tipped masonry drills. Applications are shown. Metro Tool & Gage Co.

37

METAL FRAMING—All-purpose metal framing for building structures, used for die storage, work horses, coil wire racks, merchandise storage, tables, and similar uses, is treated in 4-page folder. Photographs show the units and various applications. Unistrut Products Co.

38

METAL PACKINGS—made to fit standard stuffing boxes, are featured in 4-page folder entitled "Industrial Packing." Sectional sketches show different applications, and packing rings, wiper rings, as well as piston rings, are described and illustrated. France Packing Co.

39

MUSIC IN INDUSTRY—Twenty-page booklet is a "2-Year Study of the Effects of Muzak in Laundry 'X'," to determine extent of variations in productive efficiency under the influence of specially programmed music. Graphically illustrates results of comparison, and tables show analyses by weeks. Muzak Corp.

40

MAINTENANCE MATERIALS—for roof and floor surfacing, waterproofing, and protection of all surfaces, are described in 4-page circular. United Laboratories.

41

OXYGEN INDICATOR—for measuring oxygen content of gaseous mixtures in chemical, petroleum, and allied industries, in gas transmission and distribution, and similar uses, is the subject of 4-page text. Describes construction, operation, and maintenance Mine Safety Appliances Co.

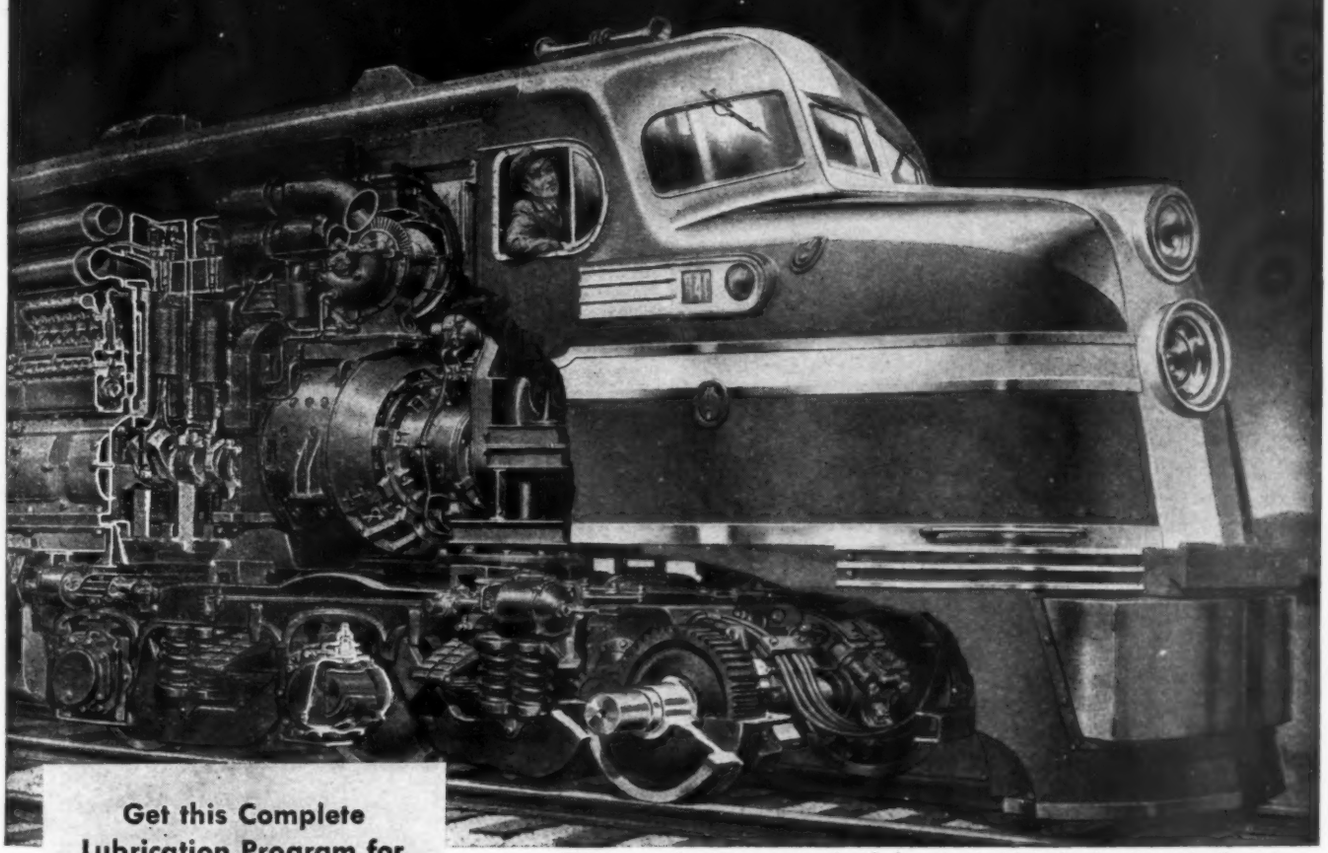
42

PACKAGING MATERIALS—for protecting shipments, are depicted in 12-page pamphlet. Pictures types for different uses, including blocking and bracing, flotation, absorbent packing, and surface protection of equipment. Kimberly-Clark Corp.

43

PALLET—Eight-way steel wire pallet for handling materials is introduced in 4-page pamphlet. Photographs show conversion to a container as well as use

Highballing Power ...and *Profits!*



This cutaway drawing was prepared with the cooperation of the American Locomotive Company.

Get this Complete Lubrication Program for all your machines

- Lubrication Study of Your Entire Plant
- Recommendations to Improve Lubrication
- Lubrication Schedules and Controls
- Skilled Engineering Counsel
- Progress Reports of Benefits Obtained

GARGOYLE Lubricants

POURING on the power...at high speeds... this big Diesel electric locomotive combines many lubrication problems similar to those in industrial plants.

Here, inside this power-plant-on-wheels, as inside every production machine, Socony-Vacuum's correct lubricants give more continuous operation at lower costs.

In the Diesel, gas temperatures soar to above 3000° F., pressures reach above 600 lb. per sq. in. Socony-Vacuum makes a Diesel oil that stands up under this heat and pressure. The generator, turbo-supercharger, driving gears and journal bearings... all operate under severe conditions. Proved Gargoyle Oils and Greases protect against wear, smooth the way for full power ahead.

Net results are the same for plant owners and railroad operators—greater output and lower costs. Why not get these benefits now and highball your production and profits?

Socony-Vacuum Oil Co., Inc.

and Affiliates: Magnolia Petroleum Co. · General Petroleum Corp.

TUNE IN "THE MOBILGAS PROGRAM"—MONDAY EVENINGS, 9:30 E.S.T.—NBC

MILFORD
PROFILE SAW
for all contour sawing, jig and band saw machines
EDGE HARDENED
Teeth as hard as a hack saw blade—long endurance.
TOUGH AND FLEXIBLE — Made from electric furnace saw steel—side wear reduced to a minimum.
MILLED TEETH — Uniformly sharp for fast cutting.
PRECISION SET—Will follow a straight or contour sawing line accurately.
Backed by the "know-how" of saw specialists since 1876.
Order from your Mill Supply Distributor. He is always ready to serve your needs for all factory and mill supplies, as well as Milford hack saw and band saw blades.
The MILFORD PROFILE dispenser box was designed to insure maximum strength. The corners are supported by wooden blocks which prevents any crushing or binding. No binding wires are used. Simply run out, measure and cut desired length. Done in a jiffy. Saves hands and guards coil against corrosion. All boxes plainly labeled.
MILFORD
PROFILE AND BAND SAW BLADES
REZISTOR AND DUPLEX HACK SAW BLADES
THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively for Over 65 Years
NEW HAVEN 5, CONNECTICUT, U. S. A.

as pallet. Features, sizes, and capacity are listed. Tri-State Engineering Co.

44

PARTITIONS—Non-bearing hollow wall system of fireproof, sound-insulating partitions is set forth in 18-page catalog. Contains architectural tracings showing methods of handling electrical work, door bucks, and other features. National Gypsum Co.

45

PLASTIC SURFACING FOR PLYWOOD—designed to make it water-resistant, weatherproof, parasite-proof, stainproof, washable, and protected in various other ways, is the topic of 8-page brochure. Contains tables on properties and uses. Kimberly-Clark Corp.

46

POWER TRUCKS—Turret-type power trucks are depicted handling loads under various conditions in 8-page brochure. Explains capacities, sizes, dimensions, specifications, and other features. Salsbury Motors, Inc.

47

PROTECTIVE COATINGS—Visual Index shows industrial applications for the different types of "Bitumastic" protective coatings. Large composite drawing of a factory shows where the coatings can be used in prevention of corrosion. Wailes-Dove-Hermiston Corp.

48

PUMP PACKING—Four-page folder No. 813 gives instructions on the selection and installation of the proper packing for different size centrifugal pumps of chemical- or corrosion-resisting types. Includes information on stuffing box arrangements, slurry problems, handling high suction heads. The Duriron Co.

49

PUMPS—Ball bearing Type DMD two-stage pumps, with capacities from 75 to 700 g.p.m., for clear water services, are depicted in 8-page illustrated Catalog No. C746. Contains construction details, performance curves, selection tables, and dimensions. Economy Pumps, Inc.

50

RADIATORS—Grid fin-type cast iron radiators are featured in 6-page folder. Includes diagrams, dimensions, catalog ratings, sizes of connections, and other data. D. J. Murray Mfg. Co.

51

REMOTE INDICATION AND CONTROL—Engineering Bulletin 14B6641 provides details on direct current remote indication and control systems. Tells about construction, operation, and applications. Includes specifications, dimensional diagrams, charts, and pictures. Allis-Chalmers Mfg. Co., 686.

52

ROLLER CONVEYOR SWITCH—designated "Y" Flipswitch, permitting flow of

PAINT UP TO 9,600 SQ. FT. PER HOUR

INCREASE PRODUCTION AUTOMATICALLY

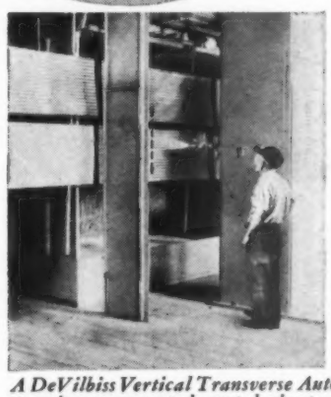
A DeVilbiss Horizontal Transverse Automatic painting plywood panels on a mass production basis.

Guns are adjustable to regulate spray pattern, overlapping and length of travel, thereby reducing overspray to an absolute minimum.

● DeVilbiss Horizontal and Vertical Transverse Automatic Spray Machines are specially designed for mass production of flat or nearly flat surfaces. Any sprayable material can be handled with the rate of production determined by the nature of the object and type of coating required.

Human variables associated with manual spraying are eliminated. High production is accompanied by absolute uniformity and control of finish quality.

Very likely you too can increase production by doing your coating and finishing automatically. Consult DeVilbiss . . . for help with your problems.



A DeVilbiss Vertical Transverse Automatic spraying corrugated metal sheets. These machines are frequently arranged in banks to paint both sides of flatwork simultaneously.

THE DEVILBISS COMPANY • Toledo 1, Ohio

Canadian Plant: Windsor, Ontario

DE VILBISS

means **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

Make the

CRITICAL ACCURACY

you build into your machines

EASY TO MAINTAIN

MOST EQUIPMENT MAKERS who utilize Laminum in accurately fitting gear mesh and bearings do so primarily to reduce precision machining. But the same shim also assures accuracy of future service adjustments . . . too important to overlook. Bulletin on request.

Laminum shims are cut to your specifications, but for maintenance work, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated

54 Union Street • Glenbrook, Conn.

LAMINUM

THE SOLID SHIM THAT peels FOR ADJUSTMENT

materials in either direction, is presented in circular. Pictures show operation. Speedways Conveyors, Inc.

53

ROTAMETERS—for high-pressure fluid flow rate measurement and control, are treated in 8-page Catalog Section 40-A. Contains details on selection, design, and dimensions. Sketches show structure. Fischer & Porter Co.

54

SAFETY CANS—Oily waste cans and dispensing containers protected by double perforated-metal fire baffles are featured in 8-page catalog. Contains sketches showing features, and tables of dimensions. The Protectoseal Co.

55

SAFETY CLOTHING—Classifying 21 hazardous types of work found in 18 industries, different types of safety clothing suitable for each are described and illustrated. American Optical Co.

56

SEWAGE PUMPS, EJECTORS—and sludge pumps, for general service and special liquids, are treated in 32-page Bulletin 964-D. Gives construction details, dimensions, installation and operating data, specifications, and illustrations. Buffalo Pumps, Inc.

57

SPEED REDUCERS—The development of worm gear speed reducers, design features, ratings and limitations, capacities, lubrication, dimensions, and other data are treated in 8-page Bulletin 250. Includes drawings, cutaway pictures, tables. Philadelphia Gear Works, Inc.

58

STEEL JOISTS, DECK ROOFS, METAL LATH—concrete bars, and reinforcing, are discussed in 20-page catalog. Contains details of construction, loading tables, specifications, and photographs. Truscon Steel Co.

59

STEEL SKID PLATFORM—with double corrugations, and boxes are pictured and described in 4-page brochure. Explains design, features, and sizes. The Union Metal Mfg. Co.

60

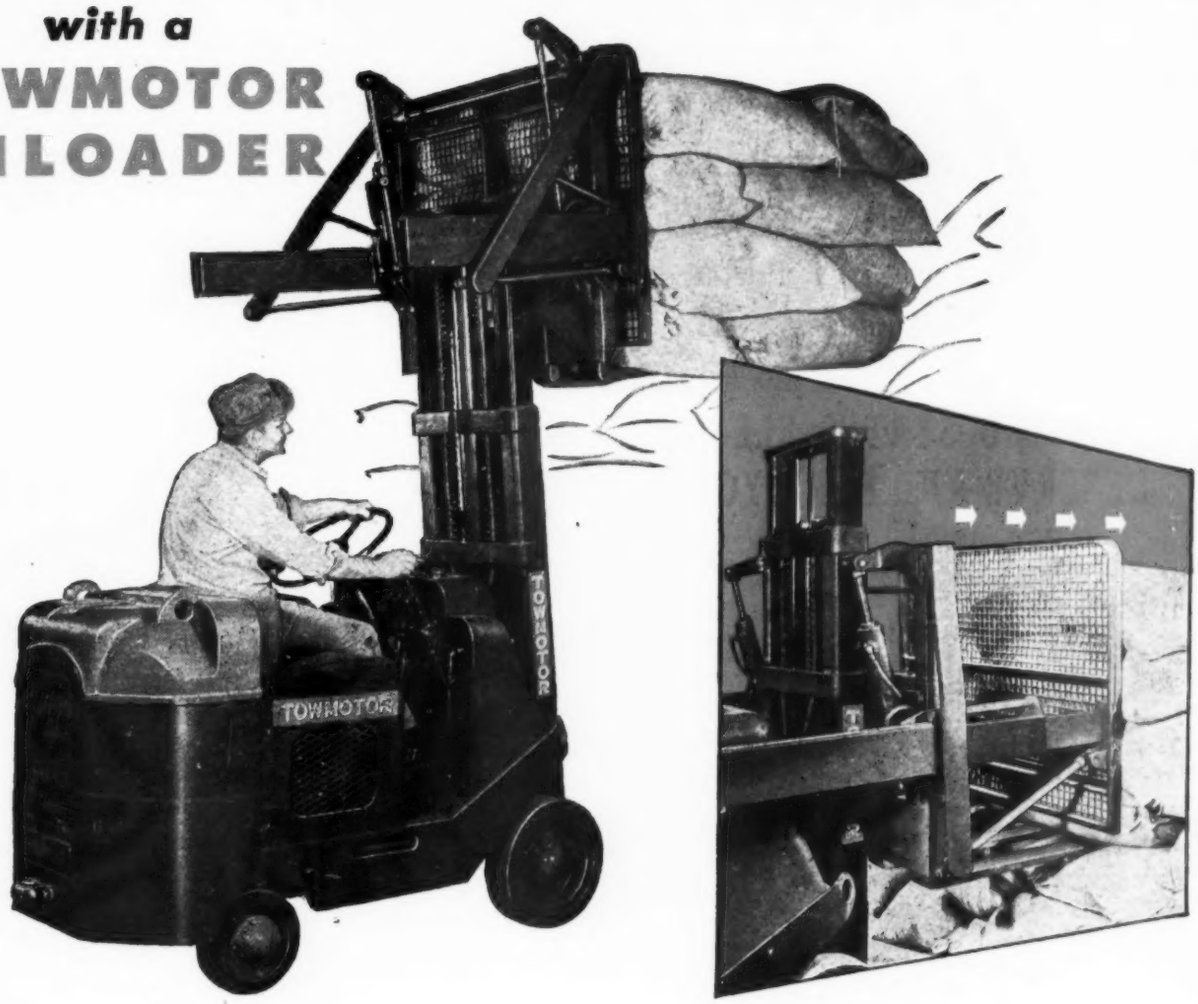
SWITCH—Data Sheet No. 38 features Type BZE-2RQ4 switch for manual safety control of air presses, punch presses, and hydraulic presses, as well as other control applications. Features are pictured, and dimensions shown. Micro Switch Div., First Industrial Corp.

61

TEMPERATURE CONTROL REGULATOR—Designated · Xactline, regulator for straight line temperature control is pictured and described in 4-page folder, which tells how it works, where it can be used, explains design, installation.

GIVING LOADS THE "BRUSH-OFF"

with a TOWMOTOR UNLOADER



Here's mechanical handling, from a fork lift truck, that completely eliminates manual unloading of stable loads. The Towmotor Unloader saves time and labor by unloading an entire load with a single, sweeping motion.

Newest of the Towmotor Accessory Group, the Unloader cuts carloading time 50%, permits placing of loads anywhere, with or without pallet. Does not interfere with normal lift truck operation. Screen height and length of unloading stroke furnished as required. Installed at the factory, the Unloader is available for use with most new Towmotor models.

Send for special bulletins describing the Towmotor . . .

UNLOADER UPENDER
SCOOP CRANE ARM
EXTENSION FORKS
EXTENSION BACKREST
RAM HOPPER
OVERHEAD GUARDS

TOWMOTOR CORPORATION
1238 East 152nd St. • Cleveland 10, Ohio

TOWMOTOR *THE ONE-MAN-GANG* **FORK LIFT TRUCKS *and* TRACTORS**

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Important! EVERY UNITED STATES ELECTRICAL TOOL IS ELECTRICALLY AND MECHANICALLY CORRECT BEFORE LEAVING OUR MODERN FACTORY

And here's more data to show you why

UNITED STATES ELECTRICAL TOOLS DESERVE AND EARN YOUR CONFIDENCE:

- All tools are subjected to a severe running test. . . .
- A dielectric test of 1,000 volts, alternating current. 60 cycles is applied between frame and running parts . . .
- All tools will operate satisfactorily on voltage 5% over or under specified voltage. . . .
- All tools are guaranteed for material and workmanship.

UNITED STATES ELECTRICAL TOOLS COVER THE ENTIRE INDUSTRIAL FIELD

PRECISION LATHE GRINDER

MODEL XX

For internal or external grinding. Ball bearing grinding wheel spindles interchangeable. For accurate work with lathe, planer, boring mill, milling machines, etc., in vertical or horizontal positions.

Contact your DISTRIBUTOR for catalogs, prices and deliveries on Portable Drills . . . Bench and Floor Buffers . . . Bench and Floor Grinders . . . Heat Guns . . . Polishers . . . Sanders . . . Surfacers . . . Flexible Shaft Machines . . . Hole Saws . . . Portable Tappers . . . Valve Seat Grinders . . . Valve Refinishing Shops, etc.

The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO

operation, applications, and features. Claud S. Gordon Co.

62

THERMOMETERS—Catalog No. 6707 describes and pictures vapor, gas, and mercury actuated thermometers and pressure gages. Cutaway view shows design details, and specimen chart sections, list of ranges, and other features are included. The Brown Instrument Co.

63

THREADING MACHINE—Bulletin No. XL-46, 8 pages, contains details on threading machines and components. Photographs, dimensional diagrams, and specification table supplement text. The National Acme Co.

64

TRUCK LOADER—Methods of handling materials with the gas- or battery-powered Trucloader are pictorially presented in 16-page booklet. Discusses width, length, capacity (1000 pounds), weight, models, tiering, turning, speed, tires, and other features of the equipment. Clark Tructractor Div., Clark Equipment Co.

65

TUBING—Characteristics, applications, analyses, mechanical and physical properties, and other data are set forth in 4-page brochure entitled "Guide for the selection of seamless and redrawn welded stainless steel tubing." Summerill Tubing Co.

66

UNIT HEATERS—Twelve-page illustrated booklet gives details and capacity tables on Grid unit heaters with cast iron heating sections. Features of design and construction are explained, and principles are graphically shown. Engineering data are provided. D. J. Murray Mfg. Co.

67

VALVES, PIPE, FLANGES—hose nipples, castings, bars, forgings, wire, electrodes, and screw machine products are treated in 8-page Bulletin W-350-B5A. Provides dimensional sketches and tables, photographs, and sizes. Worthington Pump & Machinery Corp.

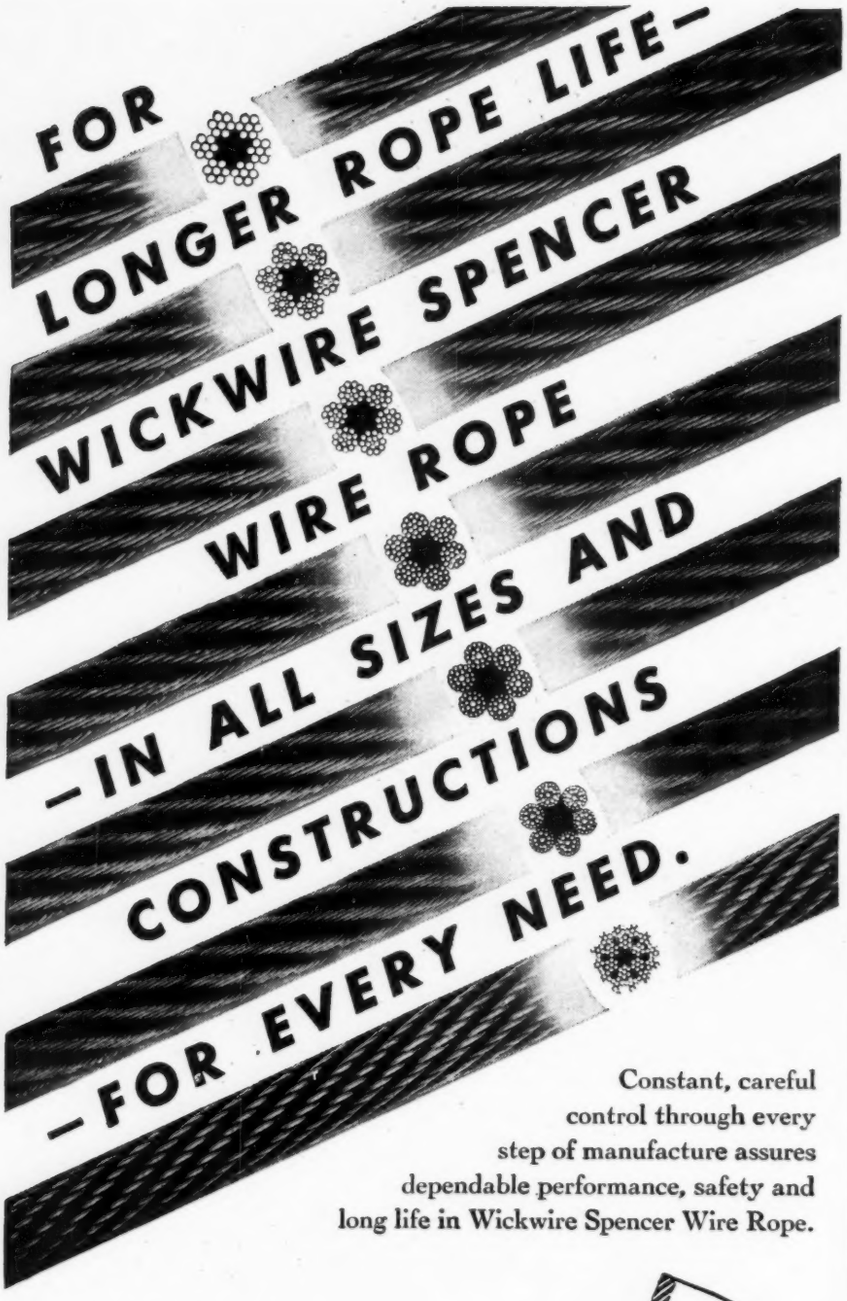
68

VOLTAGE CONTROL EQUIPMENT—Powerstat variable transformers, Seco automatic voltage regulators, and Voltbox a.c. power supplies are treated in 12-page Bulletin No. 150. Contains charts, circuit diagrams, and other data. Superior Electric Co.

69

WASHROOM FOUNTAINS—of different capacities are set forth in two folders. The Duo-Washfountain for use by two workers at a time is outlined in 4-page Bulletin No. 464-D. The second pamphlet covers fountains of enameled iron and stainless steel in circular and semi-

What jobs have you for CARMET to do?
Special Blanks made from
CARMET CARBIDES
Take a look, above, at a few of the many preforming jobs we do with Carmet—then tell us where we can help *you* to utilize the great wear-resistance of sintered carbides. The point is: we have an entirely complete line of Carmet carbide cutting tools and blanks, but we also specialize in preformed carbide machine parts of practically any size and shape—gage blanks, bushings, die parts, etc.—furnished either "as formed" or finish-ground to exacting tolerances. ● Let us work with you—*call for an Allegheny Ludlum Tool Engineer.*
Allegheny Ludlum Steel Corporation
CARBIDE ALLOYS DIVISION, Ferndale (Detroit) Michigan



Constant, careful control through every step of manufacture assures dependable performance, safety and long life in Wickwire Spencer Wire Rope.

HOW TO PROLONG ROPE LIFE AND LESSEN ROPE COSTS . . .

Thousands of wire rope users—old hands and new—have found "Know Your Ropes" of inestimable value in lengthening life of wire rope. Contains 78 "right and wrong" illustrations, 41 wire rope life savers, 20 diagrams, tables, graphs and charts.

For your FREE copy, write
Wire Rope Sales Office, Palmer, Mass.

CF&I **WICKWIRE SPENCER STEEL DIVISION** W
The Colorado Fuel and Iron Corporation
THE CALIFORNIA WIRE CLOTH CORPORATION

EASTERN GENERAL SALES OFFICE
361 DELAWARE AVE., BUFFALO 2, N. Y.

EXECUTIVE OFFICES
DENVER 2, COLORADO

WEST COAST OFFICES
OAKLAND 4, CALIFORNIA

circular types, for up to 10 users. Bradley Washfountain Co.

70

WASHROOM LAYOUTS—Twelve-page brochure deals with washroom planning, including location, construction and equipment, size, as well as washing, locker, shower, and toilet facilities. Drawings of layouts and photographs of equipment are given. Bradley Washfountain Co.

71

WELDING, BRAZING AND SOLDERING—Welding Manual, 24 pages, contains instructions on welding, brazing, and soldering, explaining when and how to use each process. Deals with the common metals, with data on handling each type, and sections are devoted to light- and heavy-gage work. Describes the Magic Wand portable welder. Patent Specialties, Inc.

72

WELDING TECHNIQUE—Bulletin W-2A, a revised edition on welding technique, features the welding of aluminum bronze electrodes by the carbon and metallic arc methods. Contains weldability chart for copper-base alloys, listing 33 types, chemical composition, physical properties, and other data. Ampco Metal, Inc.

73

WINDOWS AND DOORS—Illustrated 72-page catalog deals with steel double-hung, projected, intermediate combination, awning-type, and pivoted types of windows. Also covers steel doors, vertical lift, two-section turnover, accordion, and doors of other design. Includes sketches showing installation details, as well as detailed specifications. Truscon Steel Co.

74

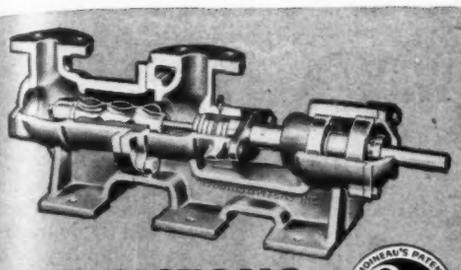
WIRE ROPE—Catalog No. 101 lists prices, sizes, strengths, and weights of flexible hoisting rope, haulage rope, galvanized running ropes, hawsers, mooring lines, tiller ropes, aircraft strand and cable, and other wire rope. Sectional drawings are used to supplement text. Hackensack Cable Corp.

75

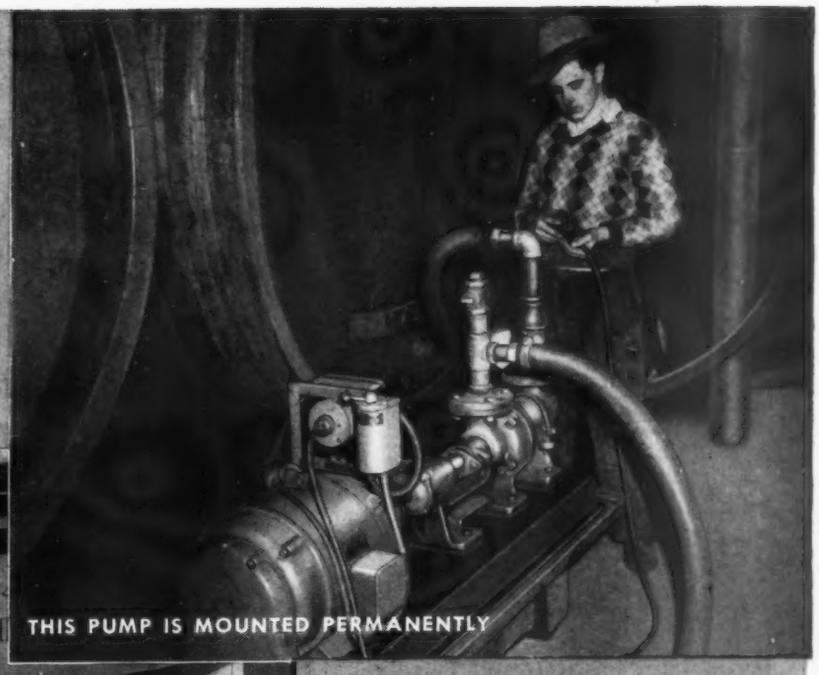
WIRE ROPE—Survey on use of preformed wire rope is presented in 16-page booklet. Contains users' answers to questions on applications, type of service, maintenance, advantages, length of service, and other details. Preformed Wire Rope Information Bureau.

76

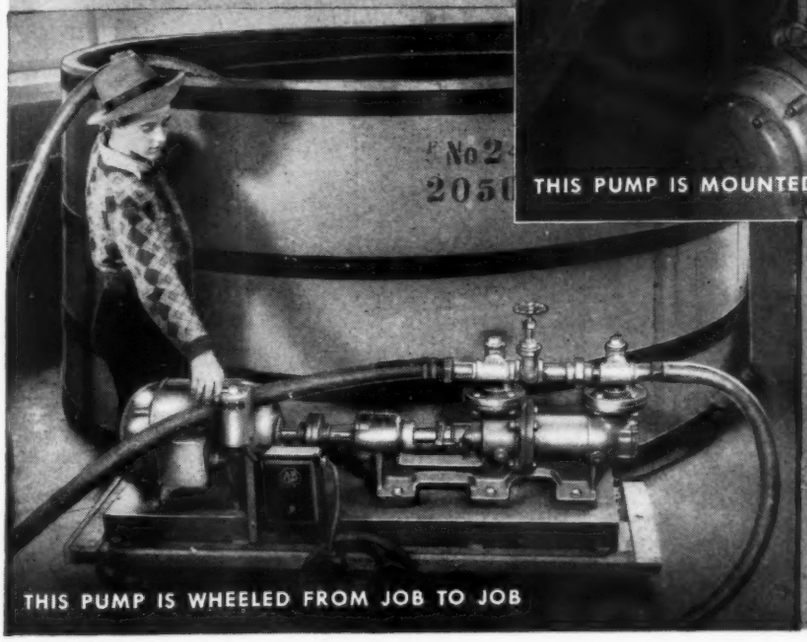
WIRES AND CABLES—Line of asbestos-protected wires and cables is the subject of 8-page Bulletin OK-2061. Covers power cables, apparatus cables, multiconductor control cables, switchboard wires, and appliance wire. Includes specifications and illustrations. The Okonite Co.



NO PISTONS
NO VALVES
No High-Speed Impeller



THIS PUMP IS MOUNTED PERMANENTLY



THIS PUMP IS WHEELED FROM JOB TO JOB

At the John G. Dorn winery, Sandusky, Ohio, a portable Moyno fills and empties fermentation tanks, and does other pumping jobs. A stationary Moyno fills and empties casks. In the fall, these Moynos also handle grapes and crushed fruit. Up to 300 feet of hose is used in the transfers.

If It Will Push Through a Pipe... You Can Pump It With a MOYNO

Moynos are the *economical* answer to hundreds of pumping problems. Without pistons, valves, or high-speed impellers, they handle practically anything from liquids to *non-pourable* pastes.

No Other Pump Is Like the MOYNO

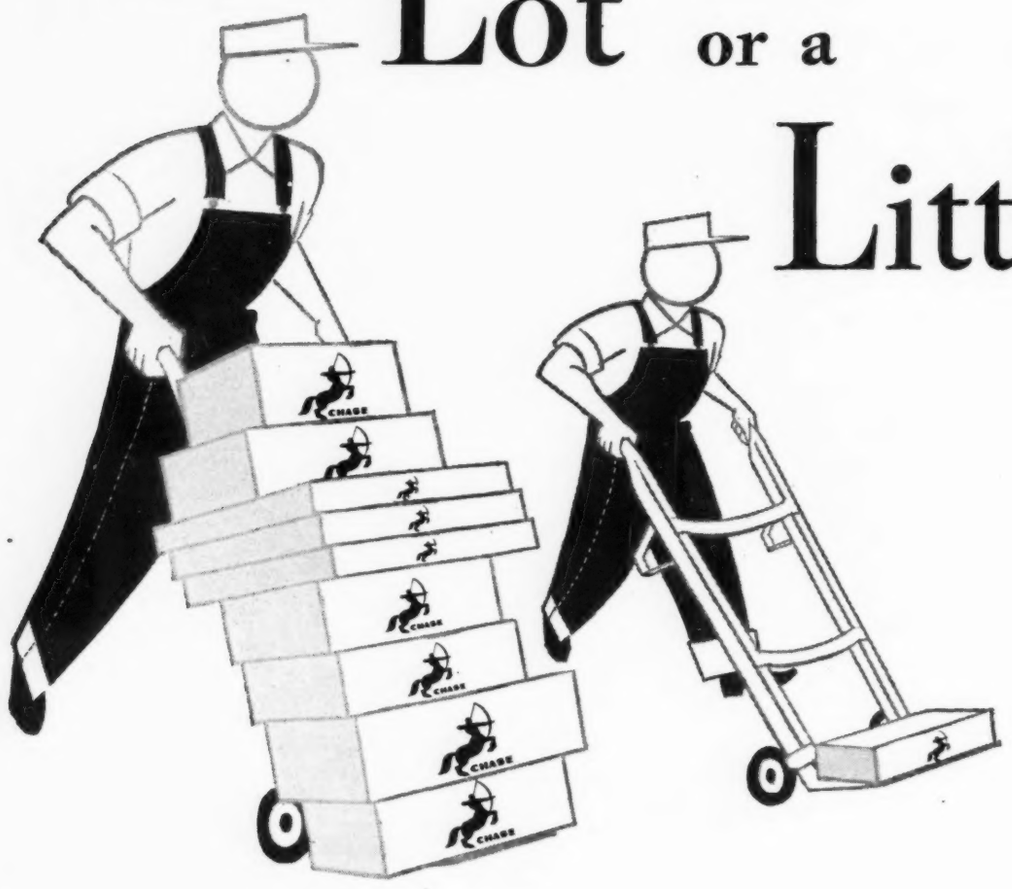
Moynos are the world's *most versatile* pumps. (1) They're reversible—just reverse rotation. (2) They pass particles and solids in suspension. (3) They resist abrasives and chemicals—*stand up* where other pumps fail. (4) They are self-priming. (5) They pump with positive pressure up to 1000 p.s.i.; *without* pulsation. (6) All types are virtually self-cleaning.

New Book Tells Whole Story

New book, "A Turn for the Better," explains the *simple* Moyno principle; gives uses, capacities, pressures, dimensions. Find out for yourself what this *amazing* pump can do. Write today.

ROBBINS & MYERS • INC. MOYNO PUMP DIVISION • SPRINGFIELD, OHIO
In Canada: Robbins & Myers Co. of Canada, Ltd., Brantford, Ont.
MOTORS · HOISTS · CRANES · MACHINE DRIVES · FANS · MOYNO PUMPS · FOUNDED 1878

For a Lot or a Little-



of BRASS or COPPER – see Chase...

BIG ONES... orders for carloads of sheet brass or miles of brass pipe. LITTLE ones too...for brass screws or soldering coppers. For a lot or a little, Chase is the Nation's Headquarters for Brass and Copper.

Chase warehouses—twenty of 'em from coast to coast—are your service stations for small orders. Larger orders get the expert attention of the Research and Production Departments of Chase mills in the East and Midwest.

Shortages are still causing delay, and we cannot accept all orders, sorry to say. But we're doing our very best to catch up with the demand for brass and copper products.

Chase Brass & Copper Co. Incorporated, Waterbury 91, Conn. A Subsidiary of Kennecott Copper Corporation.

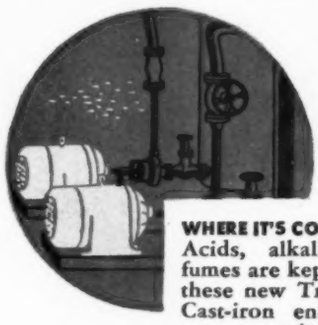
Chase

the Nation's Headquarters for
BRASS & COPPER

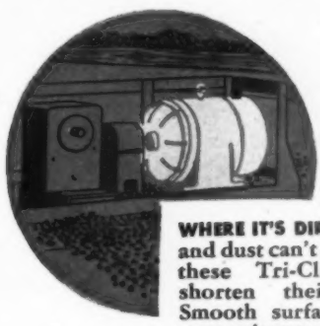
MILLS FACTORIES WAREHOUSES

FOR TODAY'S TOUGHER JOBS, HERE'S A NEW TOUGHER MOTOR

WHERE IT'S WET Wet weather doesn't bother the new totally-enclosed Tri-Clad motor. Neither do frequent "washdowns" in food plants.



WHERE IT'S CORROSIVE Acids, alkalis, and fumes are kept out of these new Tri-Clads. Cast-iron enclosures are corrosion-resistant, extra strong.



WHERE IT'S DIRTY Dirt and dust can't get into these Tri-Clads to shorten their life. Smooth surfaces are convenient to clean.

WHERE IRON DUST FLIES Harmful iron dust and metal filings can't get past the inner wall. Bearings are protected from dust.

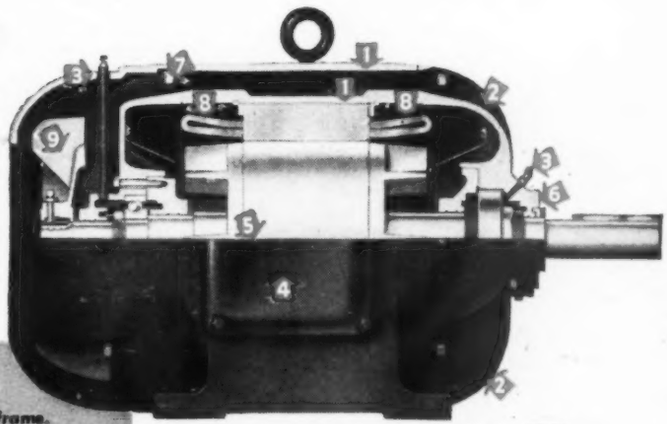
WHERE QUARTERS ARE CLOSE When space is limited for a totally enclosed motor, you'll like these trim, compact new Tri-Clads.

WHERE EXPLOSION HAZARDS EXIST The new Tri-Clad motors are available in explosion-proof constructions where needed.

THE G-E TRI-CLAD TOTALLY ENCLOSED MOTOR

(1 TO 1000 HP)

In 1940 you welcomed the Tri-Clad open motor with it's *extra protection features*. More Tri-Clads have since gone into service than any other integral-horsepower motor. Now G.E. is ready with a new line of tough, totally enclosed Tri-Clad motors for use in adverse atmospheres. *We believe they are industry's most dependable motors.* Their longer life and lower maintenance will make them a sound investment on almost every job. Apparatus Dept., General Electric Co., Schenectady 5, N. Y.



10-POINT PROTECTION

1. A cast-iron, double-wall frame completely encloses and protects the windings and punchings.
2. Corrosion-resistant cast-iron end shields are machined to provide a tight seal, and protect the motor from dust, dirt, and moisture. Primer and finish coat of Glyptal* varnish affords high rust-resistance.
3. A pressure-relief greasing system, which can be packed with long-life lubricant, protects the bearings.
4. The cast-iron conduit box is diagonally split for easy wiring. Boxes are independently explosion-proof on Class I motors.
5. Nonshrinking compound around motor leads protects motor interiors from dust and moisture at the point where leads pass through the frame.
6. Rotating labyrinth seal further protects motor interior from damage by foreign matter.
7. Large air passages provide adequate protection from overheating. They're easy to keep clean and open, too.
8. Modern, "ageless" insulation treatment includes windings of *Formex magnet wire.
9. The powerful external fan is removable to simplify maintenance; nonsparking type in explosion-proof motors.
10. Individual dynamic balance of rotors and external fans protects against vibration hazards, even under severe operating conditions.

*Trade-mark Reg. U. S. Pat. Off.

FOR THE COMPLETE STORY

Apparatus Department, Section W750-278C
General Electric Company
Schenectady 5, N. Y.

☐ Please send me GEA-4400, which describes the new Tri-Clad totally enclosed motors.

☐ Please send me GEA-4131, "Motors and Control for Hazardous Locations."

NAME.....

COMPANY.....

ADDRESS.....

8080

GENERAL ELECTRIC

remember the old felt pennant?

now, manufacturers say:
"EXCLUDE ALL DUST!"

AND BOTH JOBS CALL FOR **VERSATILE** FELT

Most people well remember the early days of motoring when wool felt pennants streamed from touring cars. "Excuse my Dust" was a favorite slogan. That was a simple job for felt.

Today felt has many more complex uses. One important job is to act as a dust shield for the external protection of bearings. Similar felt seals are also used for the retention of oil or grease at both ball and anti-friction bearings.

Modern product designers are finding an increasing number of uses for felt seals as a protection against dust and for the retention of lubricants.

American Felt Company seals fabricated for these purposes are available in three types . . . plain, impregnated, and laminated. A request on your letterhead for Data Sheet #11 "Felt Seals" will bring you complete information.

American Felt Company
TRADE MARK

General Offices: Glenville, Connecticut

PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.
SALES OFFICES: New York, Boston, Philadelphia, Atlanta, Rochester, Chicago, Detroit, Cleveland, St. Louis, Dallas, San Francisco, Los Angeles, Portland, Seattle, Montreal.

FOR THE *Best* SOLDERING JOB
USE THE *Best* FLUX

KESTER FLUXES

Photo courtesy General Electric X-Ray Corporation

• The best flux for any soldering job is the right flux. And Kester has the right flux for you.

• Nearly half a century of solder experience has resulted in the development by Kester of hundreds of flux formulas. Extensive testing—both in the laboratory and in the plant—provides Kester with complete knowledge of the performance of each flux. The circumstances under which each flux may best be used have been accurately determined.

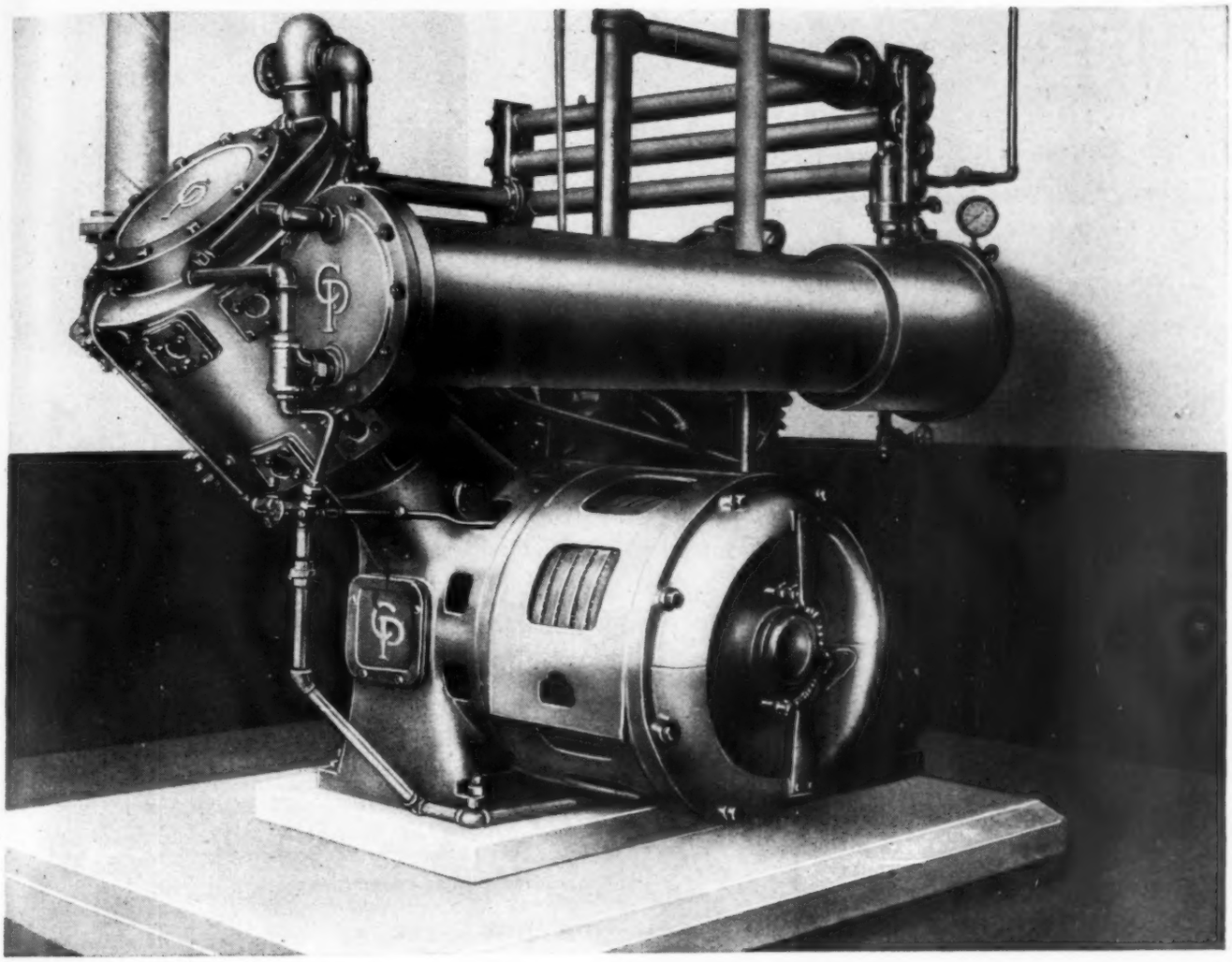
• Sweating operations—delicate dip-soldered electrical connections—all kinds of seaming—for any type of soldering job, there's a right and specific Kester flux to assure you of tight, trouble-free solder bonds.

• Consult Kester engineers whenever you have solder problems. At no obligation to you, they'll gladly recommend the right flux formula to insure the best results from any operation.

KESTER SOLDER COMPANY
4213 Wrightwood Avenue, Chicago 39, Ill.
Eastern Plant: Newark, N. J.
Canadian Plant: Brantford, Ont.

KESTER
Solder Fluxes
STANDARD FOR INDUSTRY

WHERE *Compactness* COUNTS!



CP TYPE Y COMPRESSOR IS IDEAL

ALTHOUGH designed for restricted floor space, the CP Type Y Compressor provides high efficiency and low maintenance. Shipped complete as a "package", ready for external connections, it requires only a simple foundation and no special skill in aligning or installing.

Large area Simplate valves, multi-step capacity regulation, effective intercooling, precision bearings, and force-feed lubrication assure its exceptional performance. With built-in or direct-coupled motor, or with V-belt drive, available in capacities of 500 to 900 c.f.m., at 80 to 125 pounds pressure. Sizes for other pressures also furnished. Write for information.

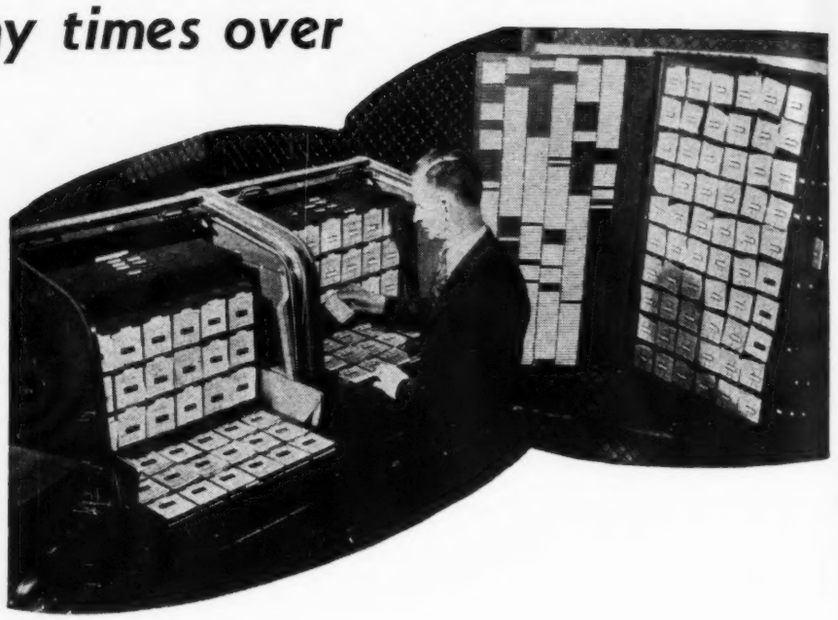
CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

FLEXIBLE TOOL CONTROL

repays costs many times over



How General Electric Company, East Plant Motor Divisio, Pittsfield, Mass., reduced tool requirements and loss, with numerous other savings over a three year period thru use of McCaskey Tool Control is told by Charles W. Reagan, Tools and Methods Dept., in the August 1946 issue of Factory Management and Maintenance.

Cost-cutting results similar to these, abstracted from his statements, can be duplicated in your plant, large or small:

- Complete over-all control of tools thru a compact, flexible system, readily adaptable to varied manufacturing needs;
- Tool requirements by departments determined and cut to minimum—more production with less tools;
- Inventory loss held to fraction of 1 percent—losses almost negligible;
- Hoarding of tools discouraged;
- Serviceability of various types of tools compared—loss and breakage checked;
- Swift and accurate inventory of all tools by depts.; tool costs readily available;
- Delivery expectation and re-order points established, insuring timely deliveries;
- System immediately operated by untrained and inexperienced employees;
- Clearance time for transferring or terminating employees cut to minimum—invaluable in placing responsibility for tools;
- Has paid for cost of equipment many times over—vital factor in success of tool division.

Whether you have one or a dozen cribs, production or maintenance tools, McCaskey Control will cut your tool costs and give you faster tool service. Reprints of Mr. Reagan's article, "Flexible Tool Control Repays Costs Many Times Over," are available on request. Write today for a copy, together with similar reports of cost-reduction and improved operations in other well known plants.

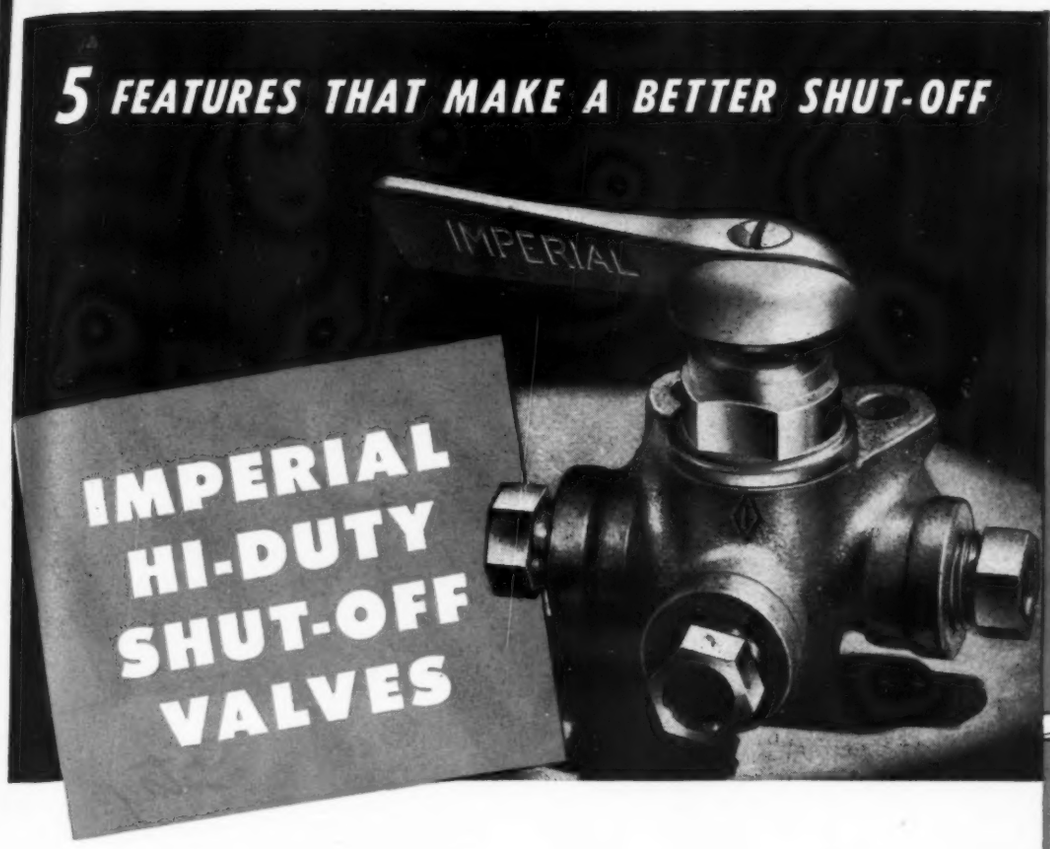
THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

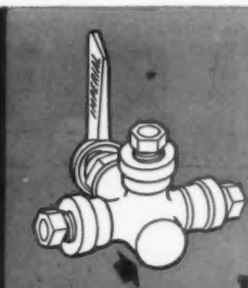
McCaskey Systems Ltd., Galt, Ontario, Canada — *The McCaskey Register Co., Watford, England*

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

5 FEATURES THAT MAKE A BETTER SHUT-OFF

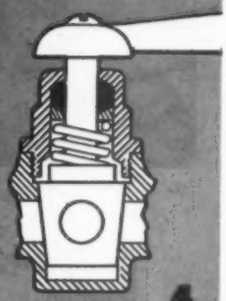




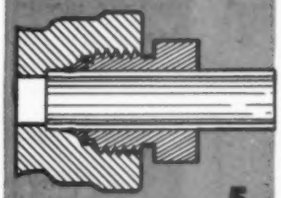
1
Solid bottom—no chance of leakage.

2
Indicating "click" tells when handle is in full open or closed position.

3
Convenient mounting bracket.



4
Spring-loaded packed stem automatically maintains proper tension on packing and plug at all times.



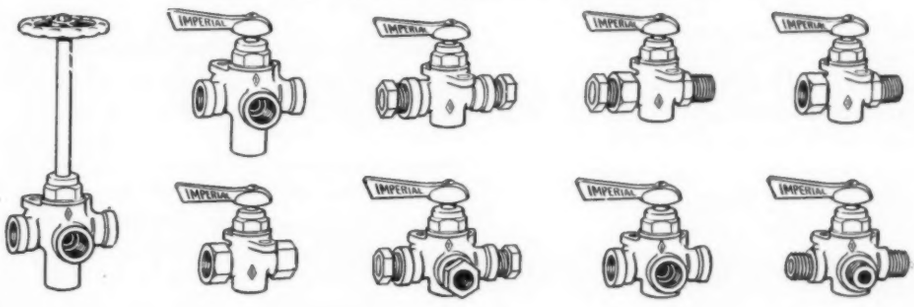
5
Valves with tubing connections are equipped with Imperial Hi-Duty Fittings—the safety fitting that provides quicker assembly and protects against vibration breakage. To assemble, simply insert tubing and tighten nut.

Here is an extra sturdy shut-off valve that will give you better performance on your products and in your plant. Provides real protection against leakage. Assures positive shut-off.

Has plug, made of special nickel silver alloy, which is double ground to prevent leakage or seizure after valve has been in use for some time. Other working parts are brass or bronze.

Imperial Hi-Duty Shut-Off Valves are used for liquids, gases, vacuum—low and medium pressure applications. Extensively used as original equipment on trucks, tractors, buses, power units on fuel and oil lines; also as shut-off or distributing valves in processing plants. These valves have an outstanding record of service in the field. Write for Catalog No. 122-A.

Some of the many styles of Imperial Hi-Duty Shut-Off Valves



WIDE RANGE OF TYPES AND SIZES. 2- and 3-way types available with any combination of tubing connections or male or female pipe threads—sizes ⅛" to ½" O.D., ⅛" to ⅜" I.P.T. 4-way valves have ¼" female I.P.T. only.

IMPERIAL

THE IMPERIAL BRASS MANUFACTURING CO.
517 South Racine Avenue, Chicago 7, Illinois

Compression, Flared, Inverted Flared, Hi-Duty, and Flex Tube Fittings • Shut-off Valves • Needle Valves • Fuel Strainers • Tube Working Tools

Two ways to measure quality in Fluorescent Lamps

1 **One way,** General Electric found, was to build the world's biggest double quartz monochrometer. With this special spectroscope, G-E lamp scientists are able to make thousands of quick and accurate measurements of light waves and of the short ultra-violet radiation that is so important in producing fluorescent light. Those measurements are vital both in fundamental lamp research and in assuring buyers of G-E fluorescent lamps of accurately standardized colors. You'd have fun operating General Electric's monochrometer—but you'd hardly have room for it in your budget or your cellar. Nor would you be inclined to duplicate all of General Electric's other research and testing facilities. But there *is* a measure of fluorescent lamp quality that's always in reach ....

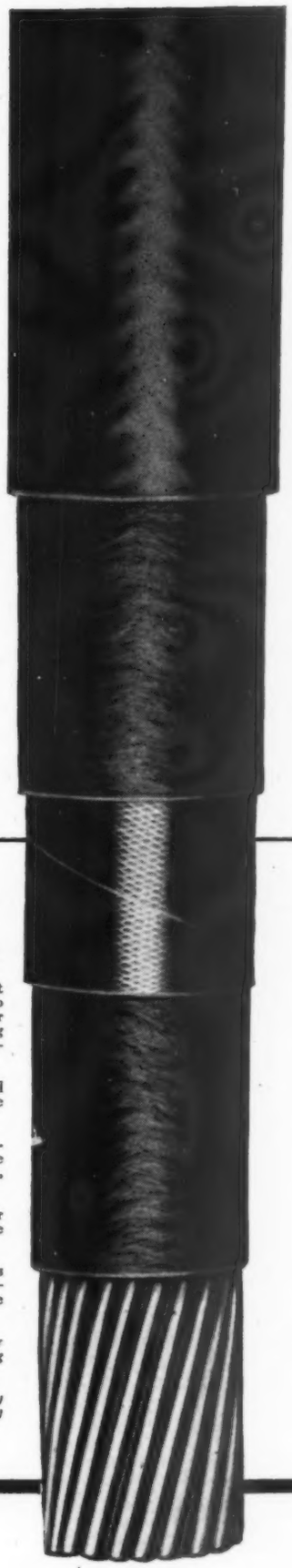
2 **Insist on the GE monogram** on all the fluorescent lamps you buy for your business and home. It's easy to understand why General Electric has been first with practically all the major improvements in fluorescent lamps when you realize that G-E Lamp scientists never rest on past achievements. *General Electric lamp research is constantly at work to make General Electric lamps ever better and to make them Stay Brighter Longer.

G-E LAMPS

GENERAL ELECTRIC

When the Heat's On

ROCKBESTOS A.V.C.



The Heat's *Off* the

MAINTENANCE DEPARTMENT

Each hot-spot circuit that is wired with Rockbestos A.V.C. means one less headache for the maintenance department. Because heat — and we mean heat that may reach a blistering 230° F. — just doesn't bake the life out of these time-tested wires and cables.

If you want to *maintain* service instead of spending time and money trouble-shooting failures, specify Rockbestos A.V.C. wires and cables. They can take punishment in failure-making locations *year after year* because they are *permanently insulated* with impregnated asbestos to resist corrosive fumes, flame, oil, grease, or condensation resulting from heating and cooling cycles.

A wide range of standard types and sizes — including Rockbestos-designed types AVA, AVB, AVL and All-Asbestos insulated constructions — will take care of anything you need up to 5000 volt rating. For a catalog containing application data write to:

ROCKBESTOS PRODUCTS CORPORATION
166 Nicoll St., New Haven 4, Conn.

This is the Construction that REDUCES MAINTENANCE

Type AVA, Rockbestos A.V.C. 600 Volt Power Cable to the right (No. 18 AWG to 2,000 MCM) and similarly insulated Motor Lead Cable have a maximum operating temperature of 230° F., and this failure-preventing construction:

Age-resistant impregnated asbestos braid that resists heat, flame, moisture, oil, grease and corrosive fumes.

Outer wall of felted asbestos insulation, impregnated with heat, flame and moisture resisting compounds, won't dry out, crack, flow, rot or burn.

Asbestos-protected varnished cambric for high dielectric strength and added moisture resistance.

Inner wall of impregnated felted asbestos withstands conductor-heating overloads — won't bake brittle or burn and helps provide greater current carrying capacity.

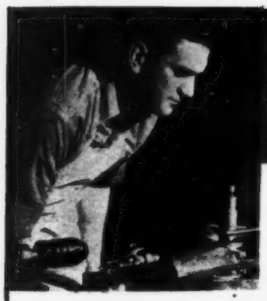
Conductor is perfectly and permanently centered in helically applied non-flowing insulation.

One of 125 different constructions designed by Rockbestos for severe or unusual operating conditions.

ROCKBESTOS A.V.C.

The Wire with Permanent Insulation

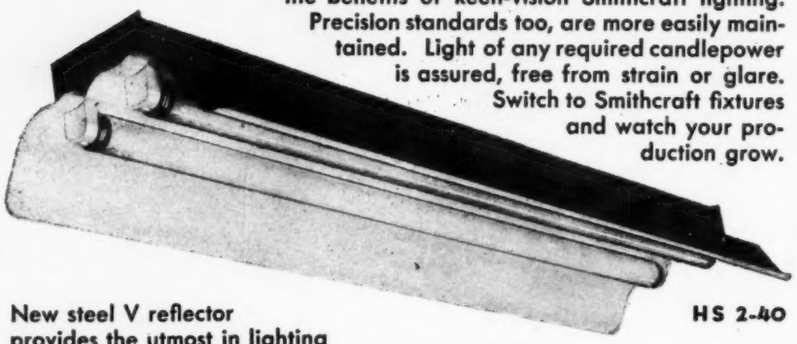
NEW YORK BUFFALO CLEVELAND CHICAGO PITTSBURGH DETROIT
ST. LOUIS LOS ANGELES SAN FRANCISCO SEATTLE PORTLAND



"I'm turning 'em out faster. Fewer rejects, too."

"It's those *Smithcraft* Lights"

Production really speeds up when workers enjoy the benefits of keen-vision Smithcraft lighting. Precision standards too, are more easily maintained. Light of any required candlepower is assured, free from strain or glare. Switch to Smithcraft fixtures and watch your production grow.



HS 2-40

New steel V reflector provides the utmost in lighting efficiency and output — gives more even distribution of light where needed — on the working plane. Eliminates much of light-loss ordinarily due to counter-reflection between and above the lamps. Call your Smithcraft dealer today for complete information.

Smithcraft

A complete line of commercial and industrial fluorescent fixtures

LIGHTING DIVISION Chelsea 50, Mass.

MERCER

"The Name that Carries Weight"

MATERIAL HANDLING EQUIPMENT

TRAILER TRUCKS

Type T-856—Fifth Wheel Steer—4 Ton Capacity

Mercer trailer trucks—available in all sizes and capacities. Model shown is built with steel deck. End and side rack sockets. Wheels mounted on roller bearings. Solid or pneumatic tires. Eye drawbar and rear coupler. Designed by engineers whose reputation is founded on doing things right. Literature available. Inquiries invited.

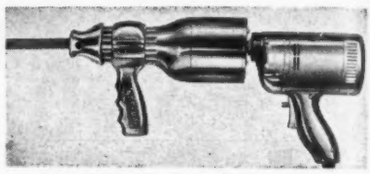
MERCER ENGINEERING WORKS, INC.
Plant: Clifton, N. J.
SALES REPRESENTATIVE
MERCER-ROBINSON COMPANY, INC.
30 CHURCH ST., NEW YORK 7, N. Y.

Every Shop Needs These

3 HANDY TOOLS

Save Labor! Speed Production!

1—For Sawing and Filing . . .

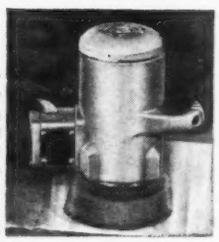


THE FAMOUS SAW-GUN
Portable Power Saw & File

Abolishes tiresome hand operations. Just pull the trigger and the Saw-Gun does the work! Speedily saws and files all metals, corrugated or plain, stainless or monel, also wood, plastics. Attaches directly to electric or air drill, or flexible shaft. Uses ordinary hack saw blade for sawing, regular machine file for filing. Reaches into tight places with ease. Ideal for panel notching and slotting. Portable. Rugged. Available with or without drill.

2—For Grinding and Sanding . . .

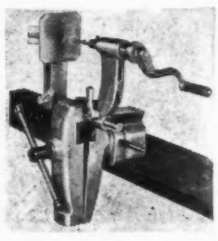
PORTABLE GRINDER



Does a faster, better job on all ordinary grinding and sanding operations, on all gauges of steel and other materials. Use it also for removing paint and rust. Three-phase motor starts at full speed. Has no gears, no brushes, no commutators. Outperforms and outlasts ordinary brush-type grinders. Completely portable. For 3-phase, 60 cycle, 230 volt operation. Three sizes, 1 h.p., 1½ h.p., 2 h.p. Either cup-wheel or edge-wheel type.

3—For Holding and Drilling . . .

TWIN-TOOL Combination VISE-DRILL



Amazing new multi-purpose tool. A Vise and Drill Combination handy for hundreds of jobs. Completely portable. Sets up anywhere. Ideal for field and road work. Use it as a horizontal or vertical drillpress; as a versatile vise; as an all-around drill; as a wheel-puller; as a broken stud remover. Vise swings on vertical axis, turns to any angle. Drill bores hardest steel, glass, etc. Equipped with ratchet handle, V-block for holding objects, extra pipe jaws for pipe ⅜" to 5". Sturdy, yet light in weight.

Send For FREE Folders Now!

Get all the details on these valuable time and labor savers. Write for Free literature now! No obligation.

W. H. HOWLAND
2533 East 73rd Street
Chicago 49, Illinois

If You Transmit Power... *call on* FOOTE BROS.

What is your particular need in power transmission?

Do you need gears—spur, helical, worm or bevel, of cast iron, steel, bronze or composition? Foote Bros. has been making gears for almost a century—giants 20 feet in diameter to midgets you can hold in one hand.

Do you need speed reducers for the machinery in your plant or the machines you make? Foote Bros. has a complete line of helical and worm gear reducers as well as flexible couplings.

Have you a problem where extreme speeds, compactness, efficiency, or low noise level are important? Foote Bros. "A-Q" (aircraft quality) gears are nearest to perfection.

Are you faced with the need of controlling or applying linear or rotary motion continuously or intermittently? Do you need an actuator to operate on an exact time cycle or control motion within close limits? Foote Bros. Power Units are the answer. They may be engineered to meet unusual space, weight or special requirements.

Wide experience, broad line and complete facilities make Foote Bros. your No. 1 source for power transmission equipment.

A recently issued bulletin on Power Units giving complete engineering data on "packages of power" will be sent on request. Also available is a bulletin on Aircraft Quality Gears. Mail the coupon.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION, 4545 S. Western Blvd. • Chicago 9, Ill.

Foote Bros. Gear and Machine Corporation,
Dept. I 4545 S. Western Boulevard, Chicago 9, Illinois
Please send me Bulletins on:
☐ Power Units ☐ Aircraft Quality Gears.

Name..... *Position*.....

Firm.....

Address.....

City..... *State*.....

Here's One Replacement You'll Be Glad To Make

You'll find it much cheaper to replace a broken goggle lens than to pay compensation and other costs for a lost eye.

The average cost of a pair of goggles is only $1.50. New Lenses cost much less. The cost of even a minor eye accident is substantially greater — often totalling many hundreds of dollars.

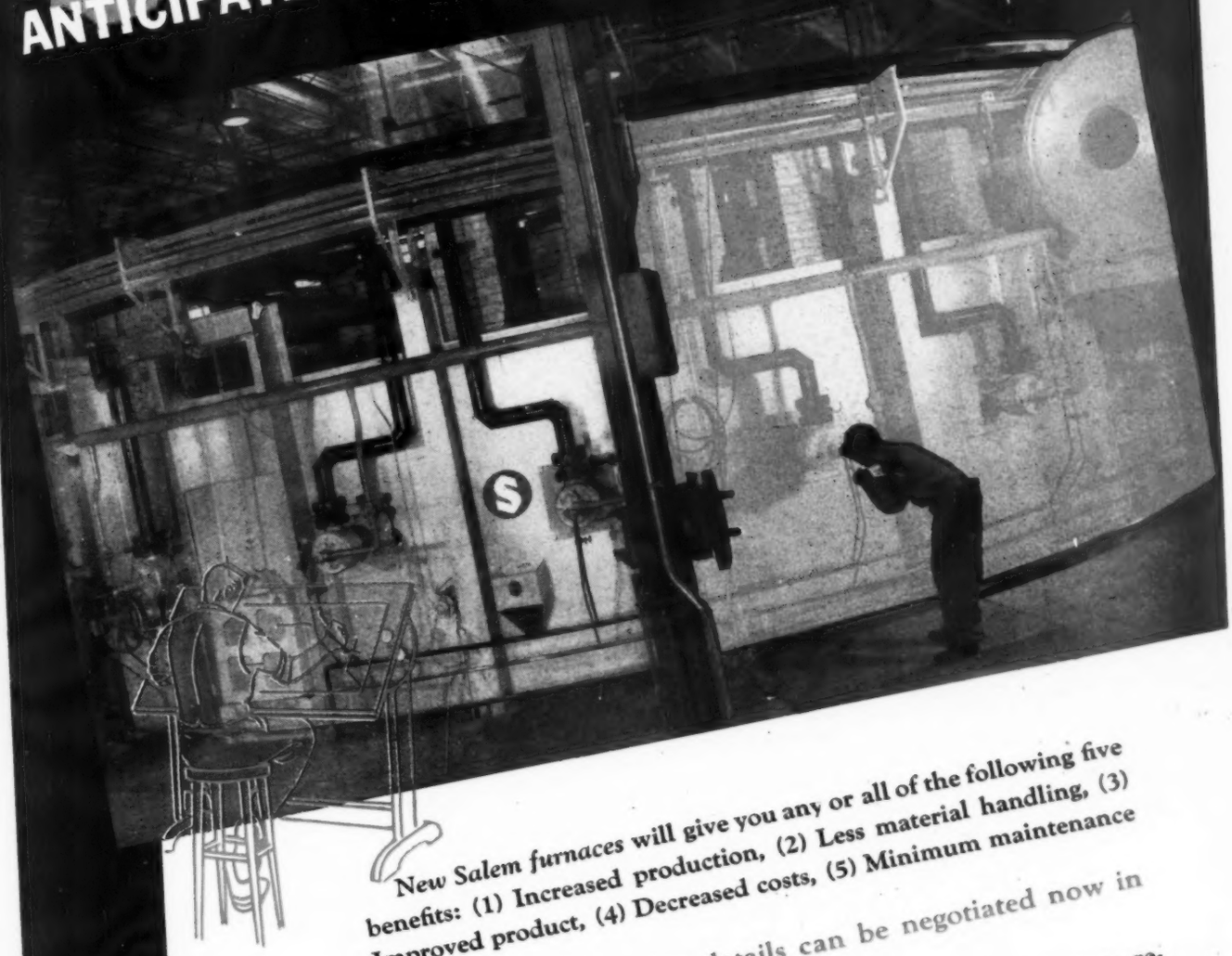
Compared to safety goggles, there is hardly a piece of plant equipment that requires such a small outlay for original installation or which saves its cost in such a short time.

Send to your nearest American Optical Safety Representative or direct to the American Optical Company, Box F, for a copy of the new book "Eye Accident Costs," telling how much eye accidents cost, how to prevent them and how much you can save by preventing them.

American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

ANTICIPATE YOUR FURNACE REQUIREMENTS



New Salem furnaces will give you any or all of the following five benefits: (1) Increased production, (2) Less material handling, (3) Improved product, (4) Decreased costs, (5) Minimum maintenance operating delays.

Functional engineering details can be negotiated now in anticipation of your desired delivery date.

You will find it well worth your while to anticipate your furnace requirements with Salem at this time. Tell us what you have in mind now.

SALEM

Engineered Heat

SALEM ENGINEERING CO.
SALEM, OHIO

TORONTO, ONTARIO, CANADA
LONDON, ENGLAND

COMPARE MODINE

with any other Unit Heater on the market!

HORIZONTAL DELIVERY
23 Models — the most popular type of unit heater for general industrial and commercial applications. Patented Modine center tappings permit direct-from-pipe-line suspension for low cost, fast installation.

VERTICAL DELIVERY
16 Models — designed for overhead installation, up near ceilings of high bays to clear plant production equipment, or at low levels as in stores and offices. Delivers large volume of air at even temperatures.

NEW POWER-THROW
8 Models — a new type of draw-through horizontal delivery unit heater designed for specialized industrial applications. Powerful, scouring jet action provides "long distance" penetration in hard-to-heat areas.

It's Today's Greatest Unit Heater Value!

COMPARE COST! You pay no more for these great new 1947 Modine Unit Heaters, which give you the newest and finest in unit heater design, plus outstanding construction and performance.

COMPARE APPEARANCE! You get the most beautiful unit heaters ever developed. Styled for today's and tomorrow's interiors; attractive beige gray finish with sparkling chrome trim is protected against rust by Modine Parker-Bonderizing.

COMPARE DESIGN! You can choose from an integrated line with 47 basic capacities for steam and hot water, perfectly coordinated in range of types and sizes, appearance, structural design and performance.

COMPARE PERFORMANCE! You can be sure of the same top quality heating performance, fuel economy, low operating and maintenance costs — which have made Modine Unit Heaters the number one choice of heating engineers for more than 20 years.

COMPARE VERSATILITY! You can now meet varying heat, air delivery, mounting height and location demands of today's complex heating jobs with three distinct types of unit heaters. Use them individually, or in combination with each other!

FREE! SEND FOR NEW COMPLETE CATALOG

Every heating engineer should have this valuable engineering data on the new 1947 Modine Unit Heater Line. Get your copy today! *Modine Mfg. Co., 1730 Racine Street, Racine, Wisconsin.*

Modine UNIT HEATERS

When you're glad you have a Snap-on

Pulling up Bearing on Swing and Traction Reverse Shaft . . .

Snap-on's Heavy-Duty Blue-Point Boxockets give you powerful leverage to turn those stubborn, large size nuts and bolts. There is no danger of slipping for Boxocket openings completely encircle the nut . . . giving equal pressure on all six sides. You can really "bear down" and complete the job quickly and safely. Each wrench head has a locking button which engages a lock hole in the handle requiring deliberate action to unlock the combination.

Blue-Point Boxocket heads are compactly designed to reach into places where many other types of wrenches cannot possibly be used. The double hexagon broaching gives you the additional advantage of a short turning arc where obstructions restrict free swinging. Sizes available from $1\frac{1}{16}$" to $3\frac{1}{8}$" with four handles from 18" to 36".

Complete information is covered in the new catalog of 4,000 Snap-on tools for production and maintenance. Send for your copy today!

Unit Crane & Shovel Corp. use many Snap-on tools in the production of their complete line of rubber-tired and crawler-mounted material handling equipment.

SNAP-ON TOOLS CORPORATION • 8044-L 28th Avenue, Kenosha, Wisconsin

HOBART Bros., Box FM-126 Troy, Ohio

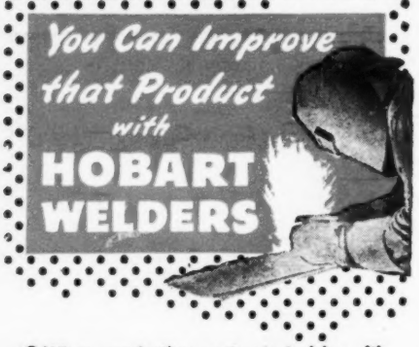
Please send .... FREE copies of HOBART Vest Pocket Guide for our Arc Welder operators. I've checked other items I'm interested in:

☐ Hobart Welders ☐ Practical Design Books for which I enclose $..... for Vols.....

Name

Firm

Address

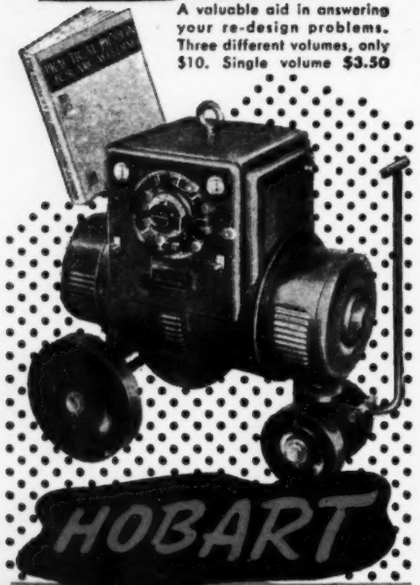


● When production costs start rising, it's time to think of converting to Hobart Arc Welding. With Hobart, your manufacturing costs reduce sharply while strength is either increased or maintained. Exclusive operation features, found only in Hobart, let you do a better job of welding easier and faster. The Multi-Range Control gives you a choice of 1000 combinations of welding heat, instantly available. The Remote Control Dial permits you to adjust welding heat at the work, eliminating wasted time in going back and forth to the machine. Use the coupon above for free copies of "Welder's Pocket Guide."

HOBART BROS. CO., FM-126, TROY, OHIO

"Practical Design for Arc Welding"

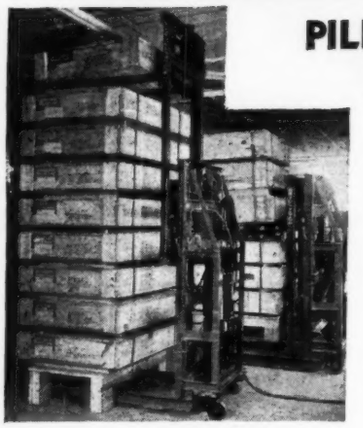
A valuable aid in answering your re-design problems. Three different volumes, only $10. Single volume $3.50



HOBART

"One of the World's Largest Builders of ARC WELDERS"

REVOLVATOR
REG. U. S. PAT. OFF.
PORTABLE ELEVATORS



Piling paper clear to ceiling utilizing all warehouse space.

PILE MATERIALS THE MODERN WAY

Adapted for handling platform skids or pallets. Platforms (revolvable or non-revolvable) to suit type of material handled. Inexpensive hand power machine for occasional use or where electric power is not available. Combination and electric models, hinged or telescopic tops for piling articles of any practical weight to any reasonable height. Push button or chain control. Many safety features.

Other Revolvator Products

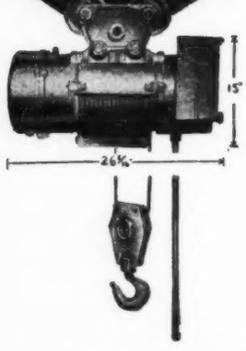
RED GIANT LIFTRUCKS HYDRAULIC ELEVATORS
RAMP ELIMINATORS TRACTION ELEVATORS STORAGE RACKS

SEND FOR BULLETIN

REVOLVATOR CO.
DESIGNERS AND MANUFACTURERS OF MATERIAL HANDLING EQUIPMENT
8761 86th STREET, NORTH BERGEN, N. J. *Since 1904*

Your Hoist Needs
all are built into
The BOB-CAT
ELECTRIC table HOIST

COMPACTNESS
LIGHTNESS
LIFTING POWER
DURABILITY
ACCESSIBILITY



It is the —

SMALLEST Requires minimum space

LIGHTEST Travels or handles along the beam easier

STRONGEST Made entirely from steel forging and castings

MOST ACCESSIBLE By the mere loosening of four bolts anyone of its three units is easily made accessible —

Write for interesting facts on the last word in Hoist Design and Construction.

LISBON HOIST and CRANE COMPANY
PIONEERS OF BETTER HOISTS, LIFTING AND CONVEYING EQUIPMENT
DIVISION OF THE WRIGHT FILE CO
LISBON, OHIO

SOS

Save or Scrap?

WHEN CORROSION PROBLEMS CALL FOR HELP, YOU CAN BE SAVING INSTEAD OF SCRAPPING . . . with *UCILON!*

IS CORROSION sending your plant, piece by piece, to the scrap heap? If it is—if corrosion is excessive and maintenance a big expense—it will pay you to investigate UCILON. Hundreds of satisfied users report that Ucilon stands up *longer* under *more* corrosives than any other material they have ever used. For example:

In a paper mill, conveyor pipe for sulphite paper pulp, containing 7% sulphuric acid and 9% alum, was ordinarily corroded through in 6 to 8 weeks. Coated with Ucilon, this pipe now lasts *7 to 10 months longer.*

In a chemistry laboratory, Ucilon was used on corrosion-testing apparatus. Subjected to fumes and spray from hydrochloric, sulphuric, and acetic acids, sodium hydroxide and sodium chloride solutions for *several months* . . . the finish is still in excellent condition.

We want you to try Ucilon on your *toughest* jobs—jobs that are too tough for ordinary maintenance paints. For we are confident that Ucilon will give you surface protection that will mean big savings in upkeep costs. Write today for complete information.

WHAT IS Ucilon*?

UCILON is a surface coating material formulated from new and improved inert synthetic resins. It is air drying and can be applied to any metal, wood, or concrete surface by brushing, spraying or dipping. Upon evaporation of the solvent, a hard, durable "plastic" coating is formed.

UCILON is remarkably resistant, to acids, alkalies, salts, alcohols, oils, water, cleaning compounds, and industrial oxidants. It has excellent flexibility, toughness, adhesion—and no taste or odor when dry. It is non-toxic, fungus-inhibiting, has good electrical resistance, and gives an attractive glossy finish.

**Ucilon is a trademark registered in the U. S. Patent Office, by United Chromium, Incorporated, for a synthetic resinous coating material.*

UNICHROME

PROCESSES AND MATERIALS

FOR SURFACES THAT SURVIVE

Chromium Plating • Porous Chromium • Unichrome* Copper
Unichrome Lacquers • Ucilon* Protective Coatings
Unichrome Stop-Off Lacquers and Compounds • Unichrome Dips
Unichrome Rack Coatings • Anozinc* Compounds • Unichrome Strip

**Trade Mark Reg. U. S. Pat. Off.*

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio • Los Angeles 11, Cal.

ON the hot spots of industry—boilers, ovens, furnaces—ordinary insulation is likely to run a fever. That's why B-H Engineers developed MONO-BLOCK, the one-block insulation that keeps btu's where you want them.

Mono-block has a built-in heat barrier—effective up to 1700° F.—thanks to a felted construction that holds millions of extra insulating air-cells. And, it stands up under severe service conditions because the fibres are pure *black* Rockwool.

Wherever you have a hot assignment, Mono-block will stretch your insulation dollar for two more reasons:—1. *It's economical to use*, one block does the whole job. 2. *It's easy to install*, cuts easily and fits snugly over rivet heads and other irregular surfaces.

Take hold of a piece of Mono-block and see for yourself why it does such an efficient job of insulation. The coupon below brings descriptive literature.

Baldwin-Hill

Specialists in Thermal Insulation Products

Baldwin-Hill Co., 512 Breunig Ave., Trenton 2, N. J.

Send a sample of MONO-BLOCK and the B-H data book "Industrial Insulation" telling how it is used.

NAME.....POSITION.....

FIRM.....

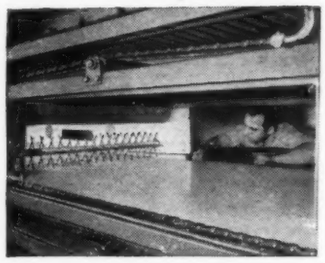
ADDRESS.....

CITY..... ZONE..... STATE.....

Silicone News

DC SILICONES

Silastic coating for conveyor belt in Birdseye dehydrater*



Silastic coating on conveyor belts of stainless steel wire cloth endures average air temperature of 450°F. and radiated heat from coils containing Dowtherm at 650°F.

When Clarence Birdseye directed his inventive genius toward quick dehydration to supplement quick freezing as a method for preserving food, a primary problem was the rapid removal of moisture without excessive surface hardening. In the machine invented by Clarence Birdseye and built by Cleaver-Brooks Co., for commercialization by Processes, Inc., the problem of quick dehydration is solved through use of controlled heat applied by conduction, convection and radiation while the drying foods are agitated mechanically and by air traveling at a velocity of 1500 feet per minute.

Under the combined action of these three types of heat, about 40% of the moisture content of foods is removed in the first six minutes of processing. Uniformity of processing depends upon free movement of food along a succession of conveyor belts each about 35 feet between pulley centers and 46 inches wide.

That's where Silastic comes into the story. The Silastic coated conveyor belt fabricated by Connecticut Hard Rubber Co., has a smooth white surface to which food particles do not readily adhere. The Silastic coating is odorless, tasteless and flexible. Furthermore, it withstands the intense heat to which foods are first subjected.

Additional data about Silastic, the Dow Corning Silicone elastomer is given in leaflet No. E 2-2.

*Trade Mark, Dow Corning Corporation

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

Chicago Office: Builders' Building
Cleveland Office: Terminal Tower
New York Office: Empire State Building
In Canada: Dow Corning Products Distributed by Fiberglas Canada, Ltd., Toronto

Dow Corning
FIRST IN SILICONES

In Insulations, too . . .

IT HAS TO BE RIGHT THE FIRST TIME!

. . . and that's what makes the skill of the J-M insulation applicator so important!

It takes more than just good materials to bring the highest returns on your insulation investment. For maximum fuel savings and peak operating efficiency, the materials *must be applied properly*...and the application must be *right* the first time.

The right insulation for every application. Your Johns-Manville Insulation Applicator can select the right insulations for your particular job because he has the complete J-M line from which to choose. There's a Johns-Manville Insulation for every service condition . . . for every temperature from 400° F below zero to 2800° F above.

J-M Insulation specialists, plus the facilities of the J-M Research Laboratory, will help you with your specific insulation problems, no matter how complex they may be.

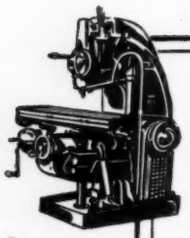
Expert application of the right insulation. Johns-Manville Insulation Applicators offer this double assurance of a completely efficient job: (1) They are thoroughly trained in all phases of insulation application; (2) They employ skilled mechanics and the most up-to-date methods of application.

For details, write your nearest J-M Insulation Applicator, or Johns-Manville, Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

JOHNS-MANVILLE *First in* INSULATIONS

. . . NOW 25% *average*

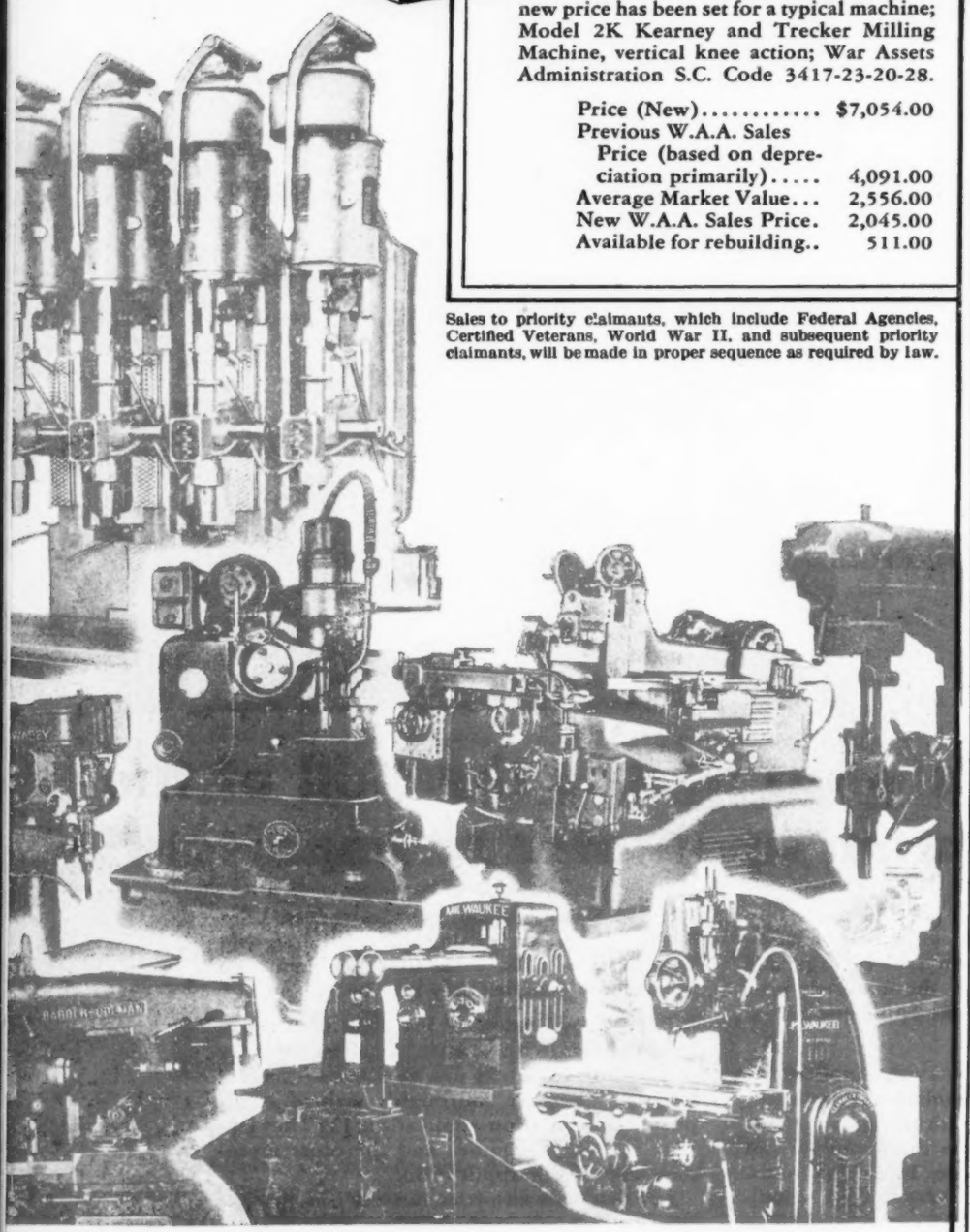


TYPICAL CASE—
MILLING MACHINE

Here is how War Assets Administration's new price has been set for a typical machine; Model 2K Kearney and Trecker Milling Machine, vertical knee action; War Assets Administration S.C. Code 3417-23-20-28.

Price (New).....	$7,054.00
Previous W.A.A. Sales Price (based on depreciation primarily).....	4,091.00
Average Market Value...	2,556.00
New W.A.A. Sales Price.	2,045.00
Available for rebuilding..	511.00

Sales to priority claimants, which include Federal Agencies, Certified Veterans, World War II, and subsequent priority claimants, will be made in proper sequence as required by law.



31 TYPES OF GENERAL PRODUCTION TOOLS REPRICED

- Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End
- Chucking Machine—Automatic, Vertical, Multiple Spindle Type
- Chucking Machine—Single Spindle Automatic, Horizontal Turret Type Machine
- Chucking Machine—Six Spindle Automatic, Horizontal
- Drilling Machine or Drill Press—Bench or Floor, Single or Multiple Spindle
- Gear Cutting Machine for Straight Bevel Gears, (Not Planer Type)
- Gear Hobber—Horizontal
- Gear Hobber—Vertical, Universal
- Gear Shaper—For External Spur Gears Only
- Gear Shaper—For Spur Gears, External or Internal
- Gear Shaper—For Spur and Helical Gears, External and Internal
- Gear Tooth Shaver—For External and Internal Gears (Rotary Type Machine)
- Gear Tooth Grinder—Generating Type, for Spur and Helical Gears
- Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine)
- Grinders—Centerless
- Grinder—Crank Pin Grinders
- Grinders—Plain External Cylindrical Grinder
- Grinder—Internal, Cylindrical, Automatic Sizing
- Grinder—Internal Cylindrical (Hydraulic Feed Machine)
- Grinder—Internal Cylindrical, Hydraulic Feed, for Hole and Face Grinding
- Grinder—Surface, Rotary Table Type
- Lathe—Multiple Tool, Not Automatic, Manufacturing Type Production Lathe
- Milling Machine—Automatic and Manufacturing Knee Type
- Milling Machine—Plain Bed Type, Horizontal Spindle Machines
- Milling Machine—Vertical, Knee Type (Not Including Bench Type)
- Polishing and Buffing Machine—Bench and Floor
- Profiling Machine—Vertical, Fixed Bed Type, Single and Multiple Spindle
- Tapping Machine—Vertical, Single or Multiple Spindle
- Thread Grinding Machines
- Thread Milling Machine
- Turret Lathe—Ram Type, Plain and Universal

MACHINE TOOL
SALES DIVISION

BELOW MARKET

NEW "FIXED PRICE" POLICY ESTABLISHED ON 31 TYPES OF SURPLUS MACHINE TOOLS

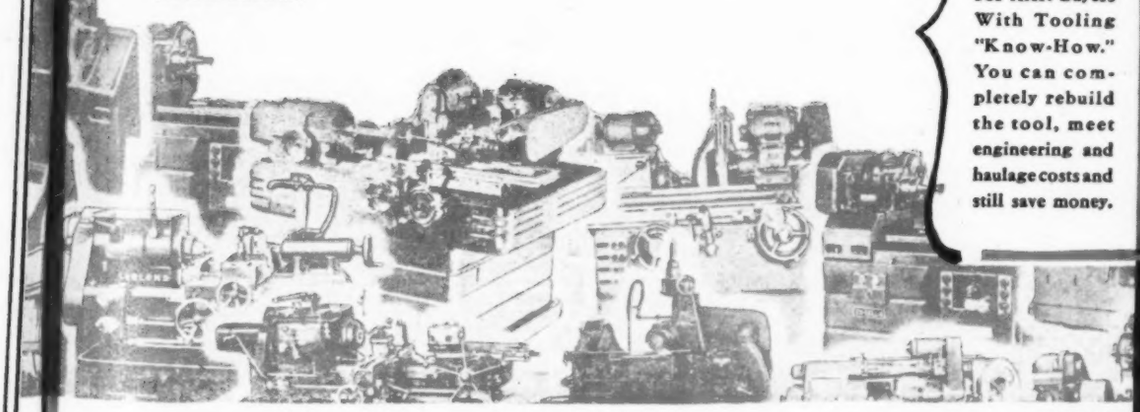
Here is good news indeed for the man who is trying to purchase general purpose production tools for replacement, reconversion or new enterprises. Now you can go into any of War Assets 33 Regional Offices, any machine tool site sale in the United States, or any approved War Assets Administration dealer and buy at the same fixed price, everywhere, the tools in these 31 groups listed at the left. No waiting for complicated figuring of prices, checks against priorities or other delaying factors. The tools are available in such quantity that your purchase can be cleared on the spot, and immediate delivery arranged.

But even more important is the principle under which the new low prices have been set. As the scale at the right indicates each price takes into consideration your costs of rebuilding the tool to new condition, engineering, service, etc. It is set well below the current market price for similar equipment sold on a full service basis. The differential is approximately 25% below market—enough for men with tooling "know-how" to realize a neat "extra" profit and at the same time acquire modern machine tools.

Plan now to check at once the detailed price and specifications list—now available in every War Assets Administration office (machine tool sales division) and the offices of your approved W.A.A. machine tool dealers.

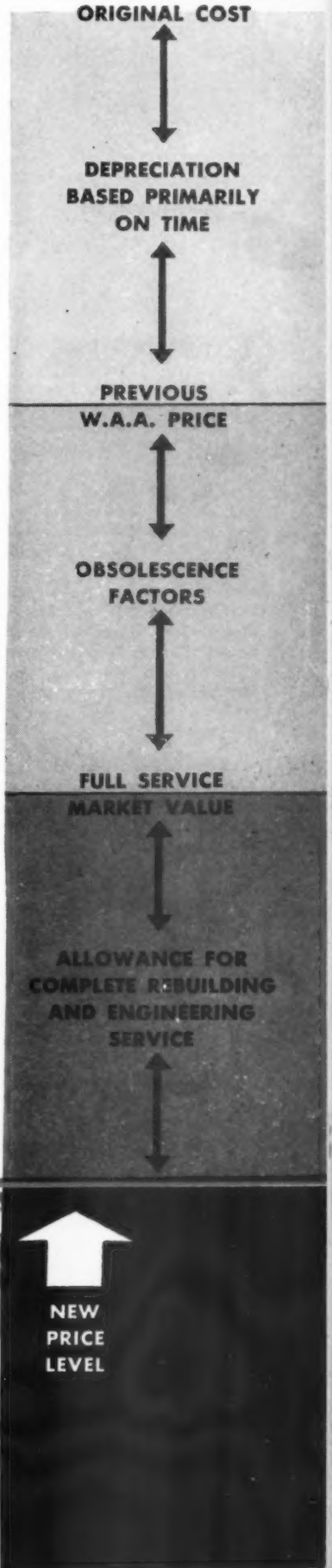
FOR DETAILED PRICE CATALOG— *WRITE, WIRE OR PHONE:*

1. *Your Regular Machine Tool Dealer*
   War Assets Administration has appointed more than 3,000 "approved" dealers throughout the U. S.
2. *W.A.A. Machine Tool Sales Division*
   In any of the 33 War Assets Administration Regional Offices listed below.



686-1

W. A. A.'s NEW PRICING PRINCIPLE



EXTRA PROFIT AREA

For Alert Buyers With Tooling "Know-How." You can completely rebuild the tool, meet engineering and haulage costs and still save money.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

. . . could only talk!

YOU'D HEAR SOME INTERESTING FACTS ABOUT PROPER TREATMENTS AND MAINTENANCE.

★ Yes, if floors could talk you would, no doubt, hear some weird tales of mistreatment and neglect and of old age before their time . . . all caused thru the use of improper floor treatments and maintenance materials. Then too, there would be many, many industrial and factory floors who'd gratefully tell about Hillyard Floor treatments and Maintenance Materials and how these materials have kept them young and attractive . . . and saved their owners money and labor too.

★ There is a Hillyard Floor Treatment Specialist in your locality, his advice is freely given on any floor or sanitation problem. Call or write Hillyards today.

SENT UPON REQUEST **FREE**

WRITE FOR YOUR COPY TODAY

THE HILLYARD COMPANY

DISTRIBUTORS

Hillyard Chemica Co. St. Joseph, Mo.
370 TURK ST., SAN FRANCISCO, CALIF.
1947 BROADWAY, NEW YORK, N. Y.

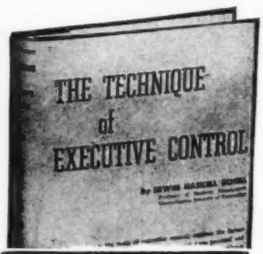
XLO MUSIC WIRE —the wire of a thousand uses now available with special alloy coating—resistant to corrosion and rust. This smooth coating acts as a lubricant, reduces tool wear, withstands 700° Fahrenheit. Highest tensile without disruption to physicals. Sizes .003" to .080".

JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.

NEW YORK AKRON DETROIT CHICAGO · LOS ANGELES TORONTO

Successful executive conduct described and analyzed

in this well-known guide to executive leadership



Just published! Sixth Edition

Today every executive is alert to the necessity of better techniques in dealing with management-labor problems, industry-public relations—and the countless daily situations which demand quick, competent leadership. This manual supplies a *system* of leadership built on a sound, proven technique of control—265 pages of authoritative advice based on successful practice, methods of getting along with others based on shrewd human insight.

Shows how to deal with problems of:

—responsibility
—discipline
—executive stimulation
—constructiveness
—self-assertion and self-expression
—leadership
—justice
—analysis of labor requirements
—introduction of the new employee
—difficulties with subordinates
—opposition
—stubborness
—disloyalty
—dishonesty
—immorality
—irresponsibility
—the agitator
—difficulties with superiors and associates
—responsibility for errors

The Technique of EXECUTIVE CONTROL

By ERWIN H. SCHELL
Professor of Business Management
Massachusetts Institute of Technology

270 *pages,* 5 x 8, *only* $2.25

This book shows that executive technique is not a mysterious sixth sense but a quality that can be definitely developed by anyone who will follow the simple methods laid down in this manual. It defines the tools of executive control; outlines the factors involved in the successful handling of others; gives practical and usable methods for getting a maximum output of work with a minimum amount of friction. Two important new chapters discuss executive attitude and moral and executive relations.

See it 10 days on Approval

MAIL THIS COUPON

McGRAW-HILL BOOK CO.,
330 W. 42 St., NYC 18

Send me Schell's Technique of Executive Control for 10 days examination on approval. In 10 days I will send $2.25, plus few cents postage, or return book postpaid. (Postage paid on cash orderr.)

Name .....
Address .....
City and State .....
Company .....
Position ..... F-FAC 12-46

(For Canadian price, write Embassy Book Co., 12 Richmond St. E., Toronto, 1).

Modern Fastening Methods Cut Down Production Costs

"SEALING WITH STEEL" SPEEDS SHIPPING

In these days of soaring production costs, the time element has become increasingly important, with the result that short cuts in every detail of manufacture are more sought after than ever before.

One department where the introduction of time-saving methods has been outstandingly successful is the shipping room, especially with regard to a basic shipping operation—sealing. From shipping rooms throughout the country reports show how clearly Bostitching is demonstrating its time-saving value.

For example, there's the Los Angeles candy maker who had been sealing corrugated cases with glue-pot and brush. After discarding these old-fashioned methods for Bostitch stapling equipment, he reports a saving of over 60% in time. From the same city comes news of equal time-saving (60%) in a totally different operation—fastening shipping wrappers on furniture—in which Bostitch automatic hammers replaced hand hammers and nails.

In fact, the types of manufacture—and of fastening—included in these reports cover a surprisingly wide range. A pottery company, for instance, formerly shipped heavy bowls and tanks in wooden crates, sealed with adhesives. Now, Bostitching on cartons has cut sealing time in half.

So it goes . . . with 60% a conservative estimate of many of the time-savings reported. Nor is that the whole story of the advantages to be gained by this modern method of fastening. There is also the elimination of costly storage space for made-up containers, while savings on materials alone have often paid for Bostitch machines in a very short time.

Finally, Bostitching offers decided advantages from the appearance viewpoint. The staples do not obscure the manufacturer's name or advertising message, while the increased protection afforded the container means that customers receive better-looking packages, in better condition.

Maximum efficiency in stapling calls for extreme care in selecting the correct staple and machine for individual requirements. In Bostitch the shipper has the world's largest line of wire-fastening machines to choose from—and the largest staff of field experts in stapling to aid him in making his choice.

Adv.

Locking the Skeleton in a Bag

SAVED 80% FASTENING COST

A manufacturer of high-quality airplane luggage uses Bostitching instead of hand-tacking to fasten the plywood skeleton, and saves 80% on the operation.

MORE BOSTITCH SAVINGS. In thousands of other cases Bostitch is lowering fastening costs: attaching two lipstick holders to display cards for the previous cost of one . . . stitching leather to metal in a grease gun packing at a saving in time and materials of half the cost of using bolts and nuts . . . sealing corrugated cases of candy in half the former time.

WHAT DO YOU FASTEN? Whatever you have to fasten: metal, plastics, cloth, wood, paper or leather—in any combination—you may find that one of the many versatile Bostitch machines can do it better and faster with wire.

Skilled research engineers, and 250 fieldmen in 91 key cities offer you the benefits of 50 years' Bostitch experience in solving fastening problems.

WRITE FOR THE FACTS. New Broadside 188 shows representative models of the 800 Bostitch stitchers, staplers, tackers, hammers . . . the world's most complete line. Write for your copy.

BOSTITCH

fastens it better, AND FASTER, with wire

ALL TYPES OF STAPLES APPLIED BY MACHINES
ALL TYPES OF MACHINES FOR APPLYING STAPLES

Bostitch (Boston Wire Stitcher Co.), 436 Mechanic Street, Westerly, R. I.
(Bostitch-Canada, Ltd., Montreal).

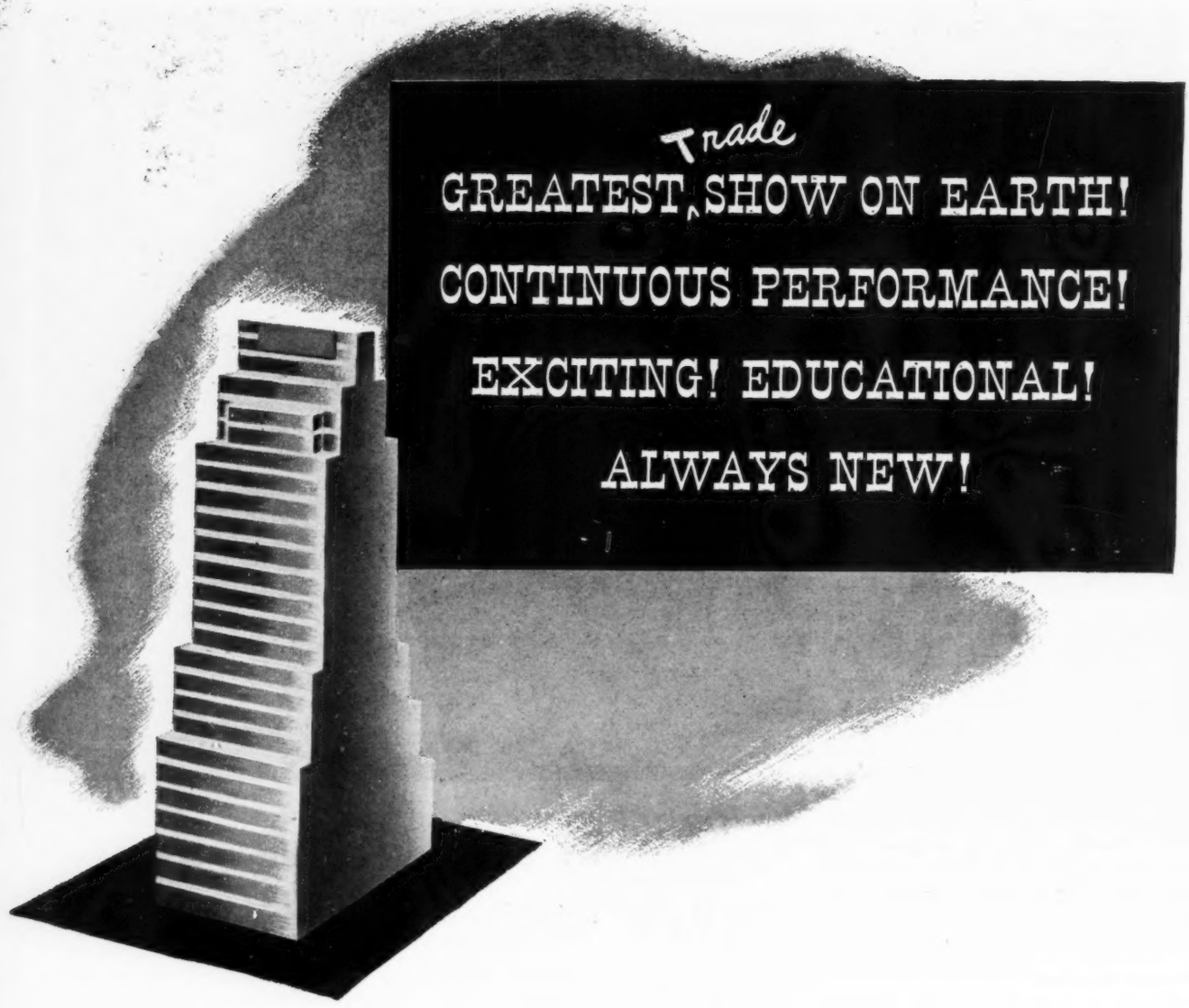
Please send literature checked:

☐ B-132, Shipping Room tools and applications ☐ B-157, Bostitching—the modern carding method
☐ B-175, Bostitching for Bag Sealing ☐ B-188, Showing representative Bostitch time-saving tools

Name .....

Company .....

Address .....



If you are interested in new products . . . new services . . . new industrial developments . . . you'll follow the parade of advertising pages that marches through each issue of all McGraw-Hill magazines.

Alert executives and technical men eagerly scan these advertisements for information essential to their business. Few buyers feel that they can afford to miss them. Reading these pages regularly is a sure way of keeping right up-to-the-minute on the developments in your field.

Add this fact to the wealth of news and information provided by McGraw-Hill's staff of over two hundred editors and over four hundred field correspondents, and you know why men say: FOR THE FACTS OF *INDUSTRIAL* LIFE, TURN TO McGRAW-HILL

McGRAW-HILL

HEADQUARTERS FOR INDUSTRIAL INFORMATION

Publishing Company, Inc., 330 West 42nd Street, New York 18, N. Y.

The McGraw-Hill Network of Industrial Communication: American Machinist • Air Transport • Aviation • Aviation News • Bus Transportation • Business Week • Coal Age • Chemical Engineering • Construction Methods • Electrical Contracting • Electrical Merchandising • Electrical West • Electrical Wholesaling • Electrical World • Electronics • Engineering & Mining Journal • E. & M. J. Metal and Mineral Markets • Engineering News-Record • Factory Management & Maintenance • Food Industries • McGraw-Hill Digest • Mill Supplies • Power • Product Engineering • Science Illustrated • Textile World • The Welding Engineer.

"BUT WHAT'S YOUR LAST NAME?"

Our last name is *Koppers*. Many of you know our "children" by their "first names," but do you know their last name?

That is important to us, and it's important to you, too.

Many of you vouch for the extra service you get from Fast's Self-aligning Couplings or American Hammered Piston Rings, or White Tar insecticides or D-H-S-Bronze . . . and don't know that their last name is Koppers. If you know, you are probably disposed to put more than ordinary trust in other products made by Koppers.

Did you know that you can get a Koppers product for coating metal surfaces to prevent corrosion? A Koppers material that makes roofs last longer? Lumber that defies decay and termites? And many other products made with the same skill and originality and inventiveness as those?

So . . . look for this trade-mark which will soon be found on all Koppers products. Here it is.

K
KOPPERS

It is the mark of an organization which is engaged in many phases of engineering, construction, chemistry and coal carbonization . . . is in the forefront of new synthetic developments . . . is an important supplier to the pharmaceutical industry and to many other industries. For top value, look for this mark. Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pennsylvania.

THE INDUSTRY THAT SERVES ALL INDUSTRY

For example . . .
for the manufacturing industries

Among the principal products Koppers provides for the manufacturing industries are:

Pressure-treated lumber which resists decay, termites, marine borers, fire and acid attacks.

Coal tar pitch waterproofing and dampproofing for foundations, retaining walls, etc.

Plastipitch Protected Metal for roofing, siding, gutters, downspouts, etc.

Pitchmastic Flooring Compound.

Tarmac road tar for roads, walks, parking areas, etc.

Bituminous-base paints and coatings.

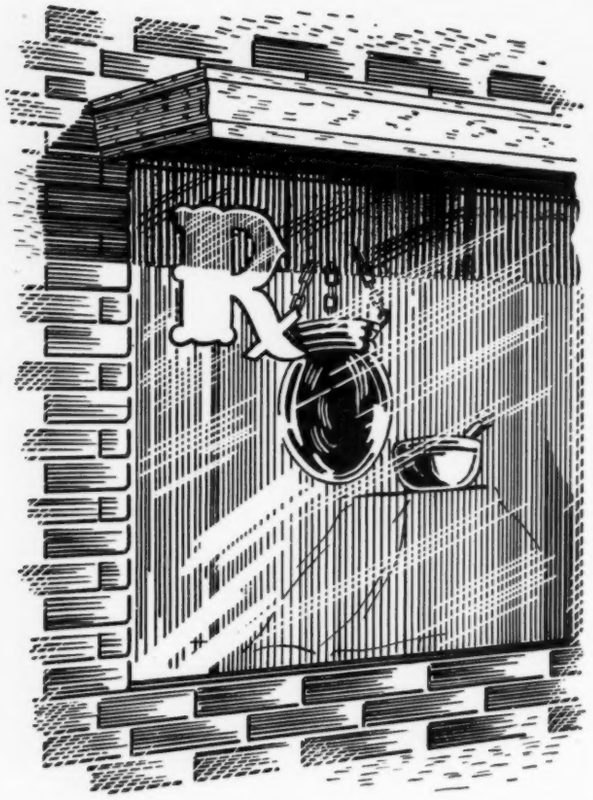
Fast's Self-aligning Couplings.

Piston Rings for automobiles, diesels, steam engines, compressors, pumps.

Packing for locomotive cylinders and valves.

Pipe Dips.

The sign of Perfection

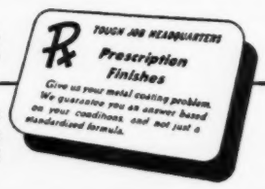


Just as the pharmacist works so diligently to assure accuracy in compounding prescriptions, Watson-Standard laboratory technicians work toward the same end in the same manner to produce the answer to your individual finishing problems.

The story behind Watson-Standard R_x Prescription Finishes is close control of ingredients, typical of the old-time apothecary, geared to modern scientific methods for even greater accuracy.

THE WATSON-STANDARD CO.

Manufacturers of
PAINTS • VARNISHES • INDUSTRIAL FINISHES AND LITHOGRAPH COATINGS


TOUGH JOB HEADQUARTERS
Rx
Prescription Finishes
Give us your metal coating problem. We guarantee you an answer based on your conditions, and not just a standardized formula.

FACTORY AND GENERAL OFFICES: PITTSBURGH, PA. • WAREHOUSES: BOSTON, BUFFALO, DETROIT, NEW YORK

HERE'S HOW TO TRADE *Pennies for Dollars*

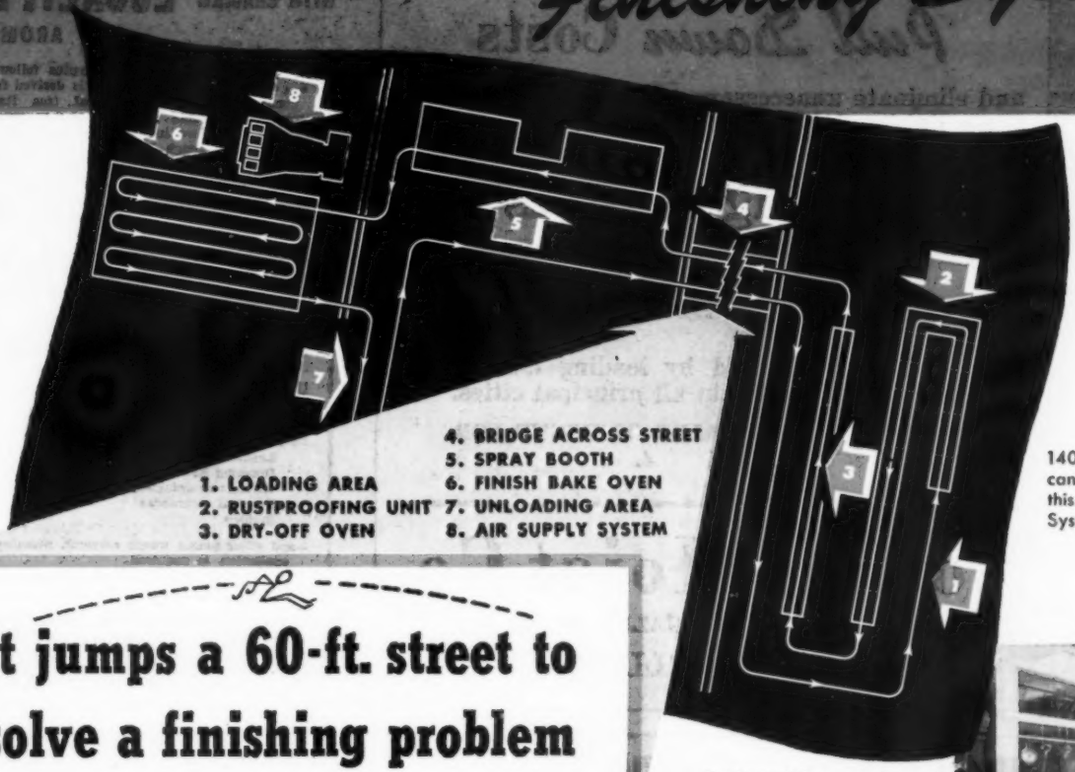
• Water, in the form of steam, should not cost more than a dollar a ton. But the same water as moisture content of sole leather would sell for well over $100.00 per ton. Can you afford to let dry air take valuable moisture out of hydroscopic materials? No, not when Armstrong Humidifiers will maintain 50% relative humidity at a cost of less than one cent per day for each one thousand cubic feet of space humidified. For complete details get a copy of Bulletin 158-B. Write Armstrong Machine Works, 804 Maple Street, Three Rivers, Michigan.

as easy and simple to install as a unit heater

• Armstrong Unit Humidifiers are easily connected to the same steam lines that supply heat to buildings. An automatic humidistat controls relative humidity within close limits. One small unit takes care of as much as 40,000 cu. ft. of space at an operating cost of less than one cent per day per 1,000 cu. ft. of space humidified.

ARMSTRONG
Industrial Type
HUMIDIFIERS

another complete DESPATCH *Finishing System*



1400 UNITS PER DAY can be processed on this Despatch Finishing System.

it jumps a 60-ft. street to solve a finishing problem

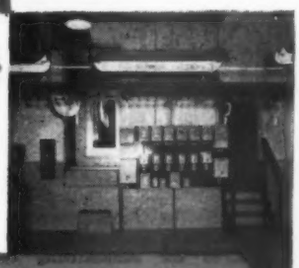
Confronted by an unusual problem involving space, handling, and finishing capacity adequate to turn out 1400 kitchen cabinets and other household appliances per day, DESPATCH engineers planned and installed the Finishing System you see above.

To do the job it was necessary to work on third floor level, to use two buildings, the roof of a third and to cross a 60-ft. street besides. Material remains on an endless conveyor 1000 ft. long.

Engineered, planned and installed under *one* responsibility, this typical installation explains why DESPATCH's broad experience in this field guarantees superior results . . . assures *you* of a unified, efficient Finishing System designed to provide maximum production at minimum cost.

U-shaped 6-stage *Spra-Bonderite* unit as seen from loading area (arrow No. 1 above). Entrance is at extreme right, exit in center of photo.

View of exit end of dry-off oven; portion of bonderizer at left. Material leaves oven on monorail conveyor (top, right) and is carried over a bridge across a 60 ft. street and into another building.



Finished parts leaving gas-fired finish baking oven. Conveyor makes 6 horizontal passes through oven, traveling approximately 225 ft. Same conveyor (right) is returning for reloading.

WRITE TODAY! Get your copy of helpful NEW BROCHURE describing the Despatch Finishing System shown above. Contains valuable information for your files. Illustrated.

DESPATCH Oven Company
611-19 S. E. 8th St., Minneapolis 14, Minnesota

Complete Finishing Systems or Individual Ovens
BAKING OVENS • RUST PROOFERS • DRY-OFF OVENS
AIR CONDITIONERS • SPRAY BOOTHS • CONVEYORS

DESPATCH
OVEN COMPANY

Both Up and Down!

Yes - - you can

Raise Efficiency
Pull Down Costs

and eliminate unnecessary employee fatigue with these light-weight, portable, economical

Coffing Hoists

DESIGNED FOR

EFFICIENCY - SAFETY - DURABILITY

Coffing Hoists are sold by leading distributors and supply houses in all principal cities.

CONTACT YOUR DEALER OR WRITE FOR FORM 4.

Coffing Hoist Co.

MANUFACTURER OF QUALITY PRODUCTS

DANVILLE, ILLINOIS

STREAMLINE INVENTORY-TAKING IN YOUR PLANT

with the tested plan given in this new book

THIS practical guide brings you details of a proven plan for speeding up industrial inventory-taking and for getting results that are both complete and accurate. Step by step it shows you the procedures to be followed and the considerations to be weighed in preparing for, and carrying out, a physical inventory. Written plainly, the book provides clear-cut help for tackling problems pertaining to all types of inventories in all types of businesses.

Just Out HOW TO TAKE PHYSICAL INVENTORY

By Richard F. Neuschel, Formerly General Procedures Supervisor, **and Harry T. Johnson,** Chief Auditor, Sperry Gyroscope Co., Inc. **159 pages, 6 x 9, illustrated with specimen forms, $2.00**

159 pages of complete step-by-step help

1—The Nature of the Inventory-planning Job
2—Physical Preparation for the Inventory
3—Planning the Inventory-taking Procedures and Organization
4—Preparation of Procedural Instructions
5—Inventory Forms and Supplies
6—Selection, Training and Utilization of Inventory Personnel
7—Summarization of the Inventory
Appendix: Manual of Instructions for Taking Year-end Inventory

THIS new book supplies practical information on the principles and techniques for planning and taking a physical inventory—from a broad discussion of preliminary preparations—to specific instructions for summarizing collected data. Based on a system which has successfully met the test of use in a multiple-plant organization, the book explains the development of policies and procedures for the inventory-taking process, and tells how to select and train personnel for following through. Complete and easy-to-follow instructions are provided for each step in the undertaking. Helpful forms and records are described and illustrated.

Look it over 10 DAYS FREE—mail coupon

McGraw-Hill Book Co., 330 W. 42 St., NYC 18
Send me Neuschel and Johnson—How to Take Physical Inventory for 10 days' examination on approval. In 10 days I will send $2.00 plus few cents postage or return book postpaid. (We pay postage on cash orders.)

Name .....
Address .....
City and State .....
Company .....
Position .....FAC 12-46

For Canadian price, write: Embassy Book Co., 12 Richmond St. E., Toronto 1.

F and E REPLACES FOUL ODORS WITH BRACING EUCALYPTUS AROMA!

The clean, pleasant tang of Eucalyptus following the use of Dolge F and E solution is derived from the genuine oil of this tropical tree itself. Wherever disagreeable smells must be replaced with a fragrant, inviting atmosphere, F and E does a quick, thorough job . . .

BUT THAT'S NOT ALL! F and E is more than a "cover-up" or camouflage. It deodorizes by chemical action; kills many putrefactive bacteria —**really destroys the source of noxious odors,** safely and harmlessly.

Economical, too—dilute F and E in 10 parts of water; apply with mop or sprayer. Add it to mopping solutions for simultaneous removal of dirt and odors.

Write for folder FE-F145 today.

USE F and E
Deodorant—Disinfectant

For: Toilets and Urinals
Lavatory Compartments
Dressing Room benches and lockers
Garbage receptacles
Hospital commodes
Stables

—and other places where efficient, pleasing sanitation is required.

The C. B. DOLGE CO.
WESTPORT, CONNECTICUT

---

it's Sturdy

No matter from which angle you look at the Fairbanks "Commander", you will find it a sturdily-built platform truck for heavy loads.

Its double angle-iron frame and rigid construction withstand hard knocks. Heavy double ball bearing swivel casters promote quick starting under full loads, permit easy rolling and easy turning, as the operator wishes.

For specifications on "the Commander" and other Fairbanks trucks, write for Catalog 50.

fairbanks

393 Lafayette St., New York 3, N. Y.
520 Atlantic Ave. Boston 10, Mass.
15 Ferry Street Pittsburgh 22, Pa.

PLATFORM, HAND AND BOX TRUCKS

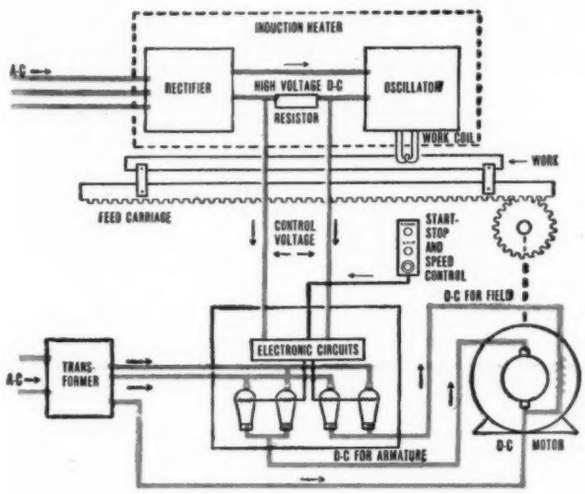
AUTOMATIC ELECTRONIC FEED DRIVE

...brings new precision to continuous induction heating!

G-E Thy-mo-trol matches feed drive speed with heater performance to maintain more uniform quality.

Automatic speed matching with G-E Thy-mo-trol drive continues to make news for machine designers! First, it was matching the rate of feed with the depth of cut on a milling machine. Then, it was keeping conveyor speeds in step with the output of an extruding machine.

AND NOW . . . it's been put to work on an electronic induction heater, maintaining tight quality control! All of this proves a point—where precise, automatic speed matching is required, Thy-mo-trol drive is a wise choice.



Control of this induction heater's feed drive is correlated with the amount of load placed on the heater work coil. Changes in the current of the heater oscillator are reflected as voltage change across a resistor connected in the heater circuit. This voltage adjusts the speed of the motor by controlling the thyratron tubes in the Thy-mo-trol panel. Thus, the speed of the feed motor almost instantaneously follows variations in the load current.

INDUCTION HEATER IS PROOF!

On continuous induction heating, the ability to vary the travel speed is very important in producing uniform heat treatment of parts. Best results can not be obtained with a constant feed rate, because in order to get the desired depth of heat penetration, the speed must be varied as the size of the part varies. Some way of readily adapting the feed speed to the size of part is needed—and Thy-mo-trol drive provides the ideal way. The Thy-mo-trol circuit is connected to the load circuit of the induction heater. In this way, Thy-mo-trol automatically changes the speed of the carriage to maintain constant power output, and thus, uniform control of hardened area. Parts move at speeds which will assure correct heating, rejects are reduced, and high-quality is maintained—because of Thy-mo-trol drive.

INVESTIGATE THY-MO-TROL DRIVE NOW!

Speed matching is but one of the many functions a Thy-mo-trol drive can perform. Some others are stepless control of speed over a wide range; holding constant speed under changing loads; and smooth, rapid, constant-current acceleration. Drives in ratings from 1/8 to 25 hp are now available. Why not get the facts on G-E Thy-mo-trol before you make a decision on your next drive? Your local G-E office will be glad to discuss it with you. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

676-195-8910

THY-MO-TROL DRIVE

3 announcements in 1

The New TRB-S56 SHELDON precision lathes

New... *an 11" lathe with "Zero Precision" Tapered Roller Spindle Bearings.*

New... *a moderate priced lathe with precision unsurpassed in any price class.*

New... *the well known "S56" now combining 11¼" swing, 1" collet capacity and zero precision tapered roller bearings.*

SPECIFICATIONS

Headstock Bearings—Tapered Roller Bearings Zero Precision
Collet Capacity—1 inch (round)
Hole Through Spindle—1⅜ inch
Swing—11¼ inches
Bed Length—56 inches
Distance Between Centers—35 inches
Spindle Drive—Double V-Belt
Spindle Speeds—8 speeds
Full Quick Change Gears—48 right and left changes 2 to 224 threads per inch
Full Double Walled Apron—Worm driven longitudinal and cross feeds
Dovetail Taper Gibs—Compound Rest and Cross Slide have screw adjusted tapered gibs to take up wear
Underneath Motor Drive—4 speed, V-Belt fully enclosed in bench pedestal
Steel Bench—Heavy Top, Braced Welded steel construction, 5 drawers

Write for the TRB-S56 circular

SHELDON MACHINE CO., INC.
4263 N. Knox Ave. Chicago 41, U. S. A.

THE SIGNODE SYSTEM

is a shipping protection SERVICE

Signode steel strapping and seals are merely the basic materials in Signode's complete system of PLANNED PROTECTION for all types of shipping containers — from small, light boxes and packages to heavy palletized units and carloads.

Out of world-wide experience — Signode engineers have developed unique methods of individualized applications to assure decreased damage in transit, reduced shipping room costs and other important savings.

Signode Steel Strapping is unequalled for strength and protection to all types of shipping containers or carloadings.

As a service to shippers, Signode offers the full cooperation of its engineers in planning specific methods of packing and stowing to achieve better shipping protection. You'll profit by a discussion. Write today to our nearest office.

DOMESTIC OFFICES:

Albany, N.Y., 11 N. Pearl St.
Atlanta 3, Ga., 325 Walton Bldg.
Baltimore 2, Md., 406 American Building
Birmingham 9, Ala., 19 Winthrop Ave., Colonial Hills
Boston 10, Mass., 51 Sleeper Street
Buffalo 3, N.Y., 775 Main St.
Chicago 47, Ill., 2600 N. Western Ave.
Cincinnati 2, Ohio, 626 Broadway
Cleveland 13, Ohio, 1200 W. 9th St.
Dallas 1, Texas, 2405 Main St.
Davenport, Iowa, 604 Putnam Bldg.
Dayton 2, Ohio 870 Reibold Bldg.
Denver 2, Colo., 1812 Stout St.
Detroit 4, Mich., 874 Brandt Ave.
Grand Rapids, Mich., 200 Ionia Ave., N.W.
Greensboro, N.C., 908 Lakeview St.
Harrisburg, Pa., Payne-Shumaker Bldg.
Indianapolis 4, Ind., 31 E. Georgia St.
Kansas City, Mo., 758 Bd. of Trade Bldg.
Los Angeles 13, Calif., 440 Seaton St.
Memphis 10, Tenn., 77 McCall St.
Milwaukee 2, Wis., 720 N. Jefferson St.
Minneapolis 15, Minn., 621 S. Third St.
New Orleans 13, La., 340 S. Diamond St.
New York City, 360 Furman St., Brooklyn 2, N.Y.
Omaha, Nebr., 1715 Dodge St.
Philadelphia 8, Pa., 401 N. Broad St.
Pittsburgh 19, Pa. 1224 Grant Bldg.
Portland 3, Me., P.O. Box 1575
Portland 9, Ore., 907 N.W. Irving St.
Providence, R.I., 1216 Industrial Trust Building
Rochester 4, N.Y., 823 Commerce Bldg.
San Francisco 7, Calif., 453 Bryant St.
Seattle 4, Wash., 1020 4th Ave., South
St. Louis 10, Mo., 4453 Duncan Ave.
Syracuse 2, N.Y., 317 State Tower Bldg.
Toledo 2, Ohio, 538 Erie St.
Winter Haven, Fla.
Worcester, Mass., 32 Franklin St.
Youngstown 5, Ohio, 3957 Howard St.

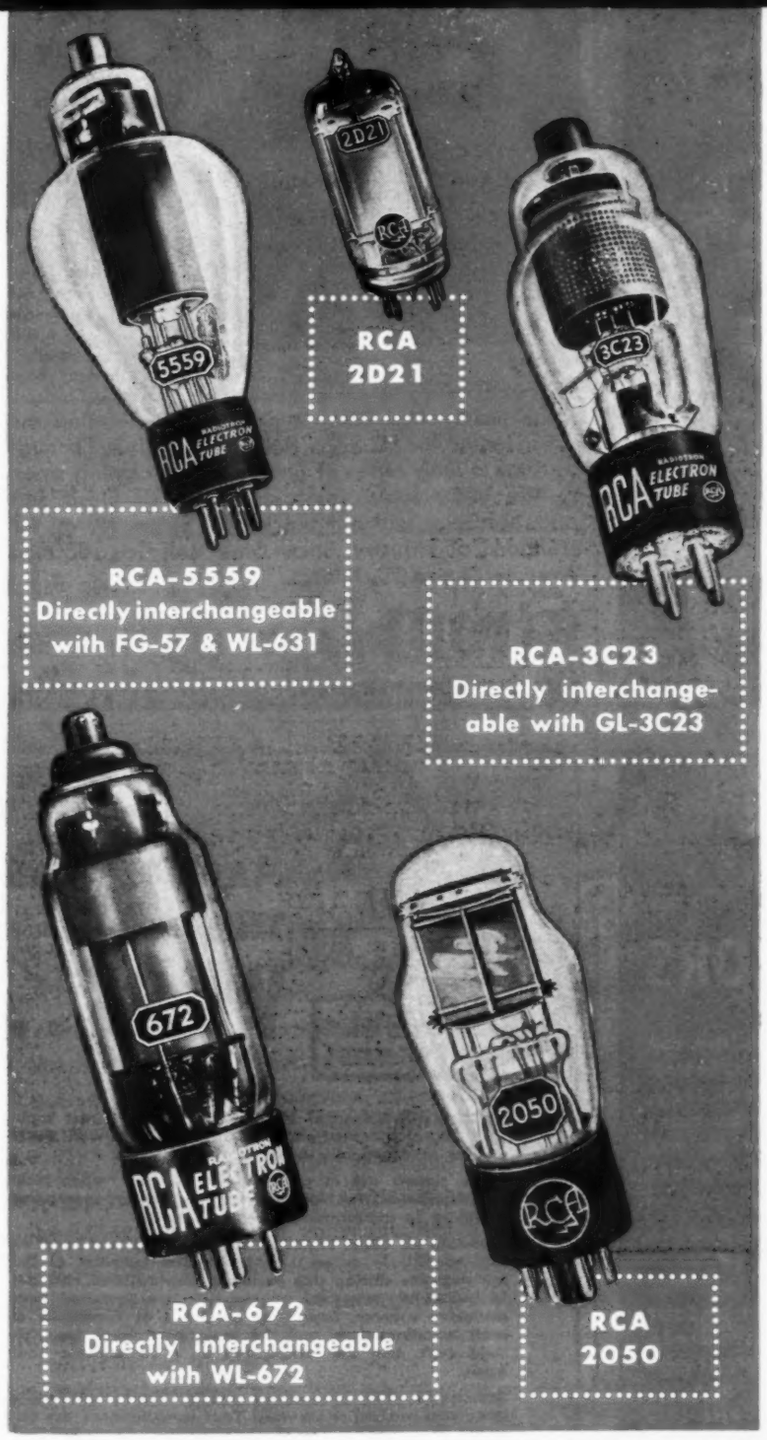
Agencies in Other Countries

Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Cuba, Czechoslovakia, Denmark, Great Britain, Greece, Hawaii, Holland, Iceland, India, Italy, Norway, Mexico, Palestine, Peru, Philippine Islands, Puerto Rico, Sweden, Switzerland, Uruguay, Venezuela

SIGNODE STEEL STRAPPING CO.
2621 N. Western Ave., Chicago 47, Ill.
361 Furman Street, Brooklyn 2, N. Y.
452 Bryant St., San Francisco 7, Calif.

SIGNODE
STEEL STRAPPING

Replace with RCA Thyratrons



- **For Ignitron Firing**
- **Relay Circuits**
- **Regulated-rectifier applications**

Directly interchangeable with other standard types

There is an RCA Thyratron for practically every purpose in welding-control units, electronic relaying equipment, and grid-controlled rectifier apparatus.

The RCA Thyratrons illustrated are representative of a large and growing family of RCA electron tubes for industrial use. At present, there are over 200 *standard* types. Included in this group is a comprehensive line of ignitrons, power amplifiers for high-frequency heating equipment, and an equally comprehensive line of high-vacuum and mercury-vapor rectifiers for low- and high-voltage applications.

RCA electron tubes for industrial use are rugged, and provide the high quality and long service life required for continuous-duty applications.

When you need renewal tubes, look to RCA.

SEND FOR BULLETIN

Radio Corporation of America
Commercial Engineering
Section IR-12L, Harrison, N. J.

Please send me Bulletin No. 2F237 covering prices, technical description and interchangeability by type numbers of the complete line of RCA industrial electron tubes.

Name_____

Street Address_____

City_____ Zone____ State_____

RCA LABORATORIES
PRINCETON, N. J.

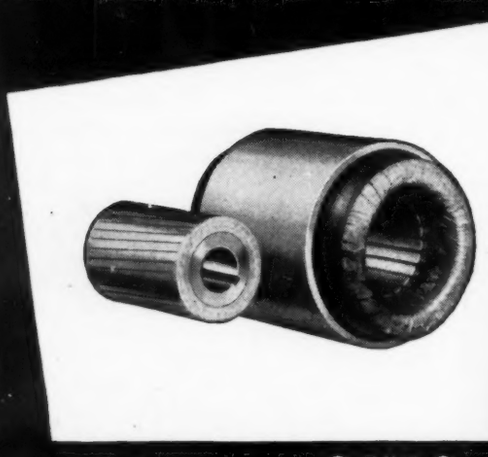
IN RADIO AND ELECTRONICS—*THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA*

TUBE DEPARTMENT

RADIO CORPORATION of AMERICA

HARRISON, N. J.

BETTER *your* PRODUCT



Specify OHIO *"Application Proved"* MOTORS

Ohio engineers do not merely "follow the crowd" in motor design. They are pioneers. For example, in the oil burner industry, nearly one-third of all domestic oil burners are powered by Ohio Motors. And in the elevator field, all principal manufacturers have used Ohio Torque Motors for 20 years!

Ohio Motors have stood the supreme test of time. To assure the success of your product, look to Ohio engineers for the "know how" to build the one best motor for your application. Write for complete information about Ohio "Application Proved" *Motors . . . Split-Phase . . . Direct Current . . . Capacitor . . . Polyphase . . . Shell Type . . . Synchronous . . . Torque.*

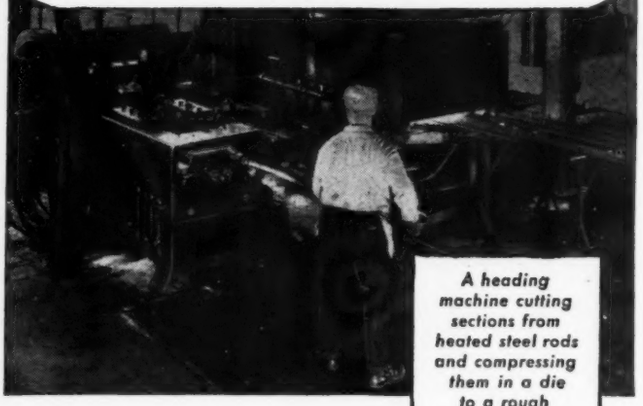
THE OHIO ELECTRIC MFG. CO.

Chester Bland, Pres.

5916 Maurice Ave. Cleveland 4, Ohio

This is How

STROM BALLS are Born



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of industry. Strom Steel Ball Co., 1850 So. 54th Avenue, Cicero 50, Illinois.

Strom BALLS Serve Industry

Largest Independent and Exclusive Metal Ball Manufacturer

MAILING LISTS THAT WORK . . .

McGraw-Hill Industrial Mailing Lists are a direct route to today's purchase-controlling executives and technicians in practically every major industry.

These names are of particular value now when most manufacturers are experiencing constantly increasing difficulty in maintaining their own lists.

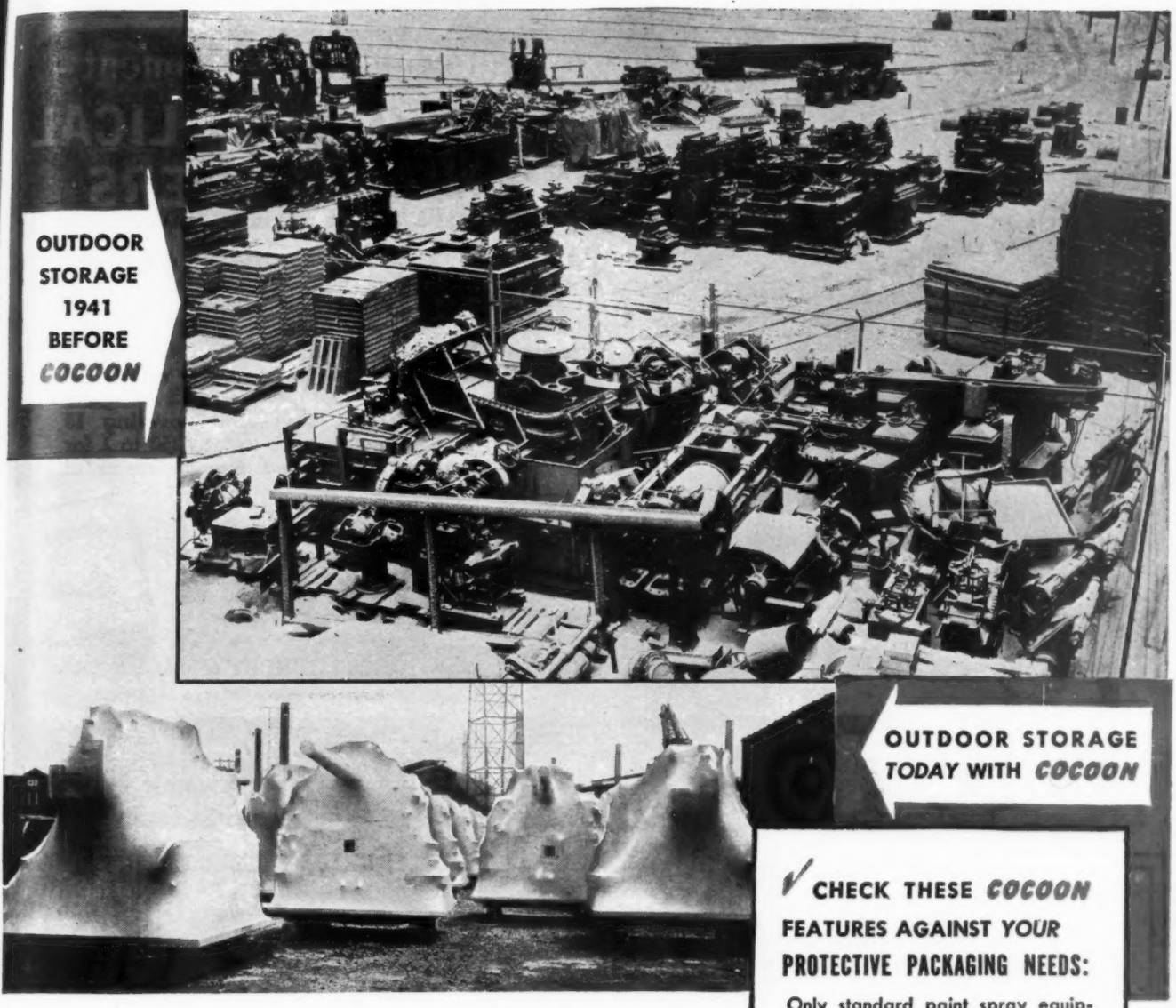
Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance during this period of unparalleled changes in industrial personnel. These lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nation-wide field staff, and are maintained on a twenty-four hour basis.

Investigate their tremendous possibilities in relation to your own product or service. Your specifications are our guide in recommending the particular McGraw-Hill lists that best cover your market. When planning your industrial advertising and sales promotional activities, ask for more facts or, better still, write today. No obligation, of course.

McGraw-Hill Publishing Co., Inc.

DIRECT MAIL DIVISION

330 West 42nd Street New York, 18, N. Y.



That is not a junk yard in the top photograph! What you see exposed to the weather are valuable drills, presses, stamps, dies stored in the open for lack of indoor facilities. Today, such equipment can be stored outside *safely*, fully protected against snow, rain, sun by Cocoon, the amazing new protective packaging applied with a spray gun. Cocoon *affords perfect protection, during shipment or storage anywhere in the world, for anything from a ball bearing to a locomotive!*

Whether *your* protective packaging problems involve electric fans, appliances, machine tools, precision instruments, small parts, or huge machines, it would be to your advantage to find out what Cocoon can do for you. Submit your problem to us for analysis. *R. M. Hollingshead Corporation, Coatings Division, Camden, New Jersey; Toronto, Canada.*

✓ CHECK THESE *COCOON* FEATURES AGAINST *YOUR* PROTECTIVE PACKAGING NEEDS:

Only standard paint spray equipment is needed . . . No rust preventive treatments are necessary . . . Permits packaging of equipment "ready to use" . . . Resists attack by major mildew and mold groups . . . Tensile strength 2000 p.s.i.; elongation 200% . . . Won't soften at plus 180°F.; remains flexible at minus 40°F. . . . Has extremely low moisture-vapor transmission rate . . . Makes packaging easy regardless of size and shape complications . . . Eliminates need for any pre-designed form or fabrications . . . Easily stripped from equipment in long, continuous sheets.

PACKAGE WITH COCOON

A PRODUCT OF

Hollingshead

LEADER IN MAINTENANCE CHEMICALS

Whiz

Applied with a spray gun Strips off like a banana peel

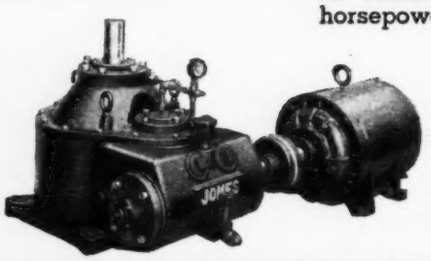
For driving agitators, mixers and similar equipment—

JONES WORM-HELICAL SPEED REDUCERS

HERE is a line of machines that fills a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, etc. requiring a vertical shaft drive.

Many of these Jones units have established excellent performance records in a wide variety of service. As a result of that experience a complete standard line has been developed covering 15 standard ratios ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.

• This Jones Worm-Helical Speed Reducer on a lacquer agitator is typical of the wide range of services for which these drives can be used such as ore roasters, pulp tank mixers, furnaces, bending rolls and similar applications



The new Jones Bulletin No. 75 covers complete details on these new Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.

W. A. JONES FOUNDRY & MACHINE CO.
4433 Roosevelt Road, Chicago 24, Illinois

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

WHERE TO BUY

Featuring additional products, specialities and services for manufacturing plants

FLOOR RESURFACING REPAIRING MATERIALS

READY-MIXED ROCK-TRED comes factory prepared. Nothing else to add. Trowel it over concrete, wood, brick and other types of floors. It's spark-proof, load-proof, non-slip and fire safe. Lasts a lifetime.

SPEED PATCH is also ready-mixed. Provides patches that can be used without delay. Simply fill broken areas with Speed Patch, tamp solid and truck heavy loads over them immediately.

ASK about our **conductive**, explosion-safe floors. Cover-Oil sealer, roofing materials, caulking compounds and other maintenance products.

Write for Complete Details Today!
ROCK-TRED Corporation
629 Washington Blvd. CENtral 6701 Chicago 6, Ill.

KESTER FLUXES

Highest Quality for 47 Years

Kester engineers will gladly assist you in working out any flux or solder problem. Write fully, without obligation.

KESTER SOLDER COMPANY
4213 Wrightwood Avenue, Chicago 39, Illinois
Eastern Plant: Newark, N. J.
Canadian Plant: Brantford, Ont.

WATERPROOF

walls and floors with Formula No. 640, a clear liquid waterproofing which penetrates concrete, brick, etc., deeply—holds 1250 lbs. per sq. ft. hydrostatic pressure. Write for technical literature and free sample.

HAYNES PRODUCTS CO., Omaha 3, Nebr.

Est. 1878 — ORANGEVILLE — Ask For CATALOG

ALL TYPES **FLOOR TRUCKS** WHEELS CASTERS

ORANGEVILLE MFG. CO.
Orangeville (Col. Co.) Penna.

POWERS TEMPERATURE and HUMIDITY CONTROL

Automatic Control

For Industrial Processes, Heating and Air Conditioning Systems, Hot Water Heaters and Shower Baths. **Write for Bulletins.**
Offices in 47 Cities
2717A Greenview Ave., Chicago, Ill.
THE POWERS REGULATOR CO.

A Good Habit . . .

This "Where to Buy" Section supplements other advertising in this magazine. . . . It's a good habit to check this page—every issue.

NEOCETA BRUSHES

holds just the right amount of paint . . .

"The Fascinating Story of Neoceta"—an intensely interesting booklet—is yours for the asking. Write for your free copy.

WEARS LIKE PURE HOG BRISTLE

SPREADS PAINT READILY

DOESN'T MAT OR FINGER

KEEPS ITS STIFFNESS IN PAINTS CONTAINING WATER

Brush Division

PITTSBURGH PLATE GLASS COMPANY

PG

5 YEARS OF NATIONAL USE

Resurfaced Freight Platform *Takes* 8-TON LOADS

Tested under the most severe conditions, Dura-Tred comes through in perfect condition!

About 2,000 sq. ft. of a Chicago freight platform was recently resurfaced with Dura-Tred 4-X, and then subjected to constant abuse and severe loads such as dolly-moved steel cylinders weighing over eight tons . . . loads only cranes and riggers could pick up! Platform condition is still perfect!

4-X can be used any place, indoors or out, where a smooth, hard surface and easier, faster trucking is desired. Write for details.

Quick Facts About 4-X!

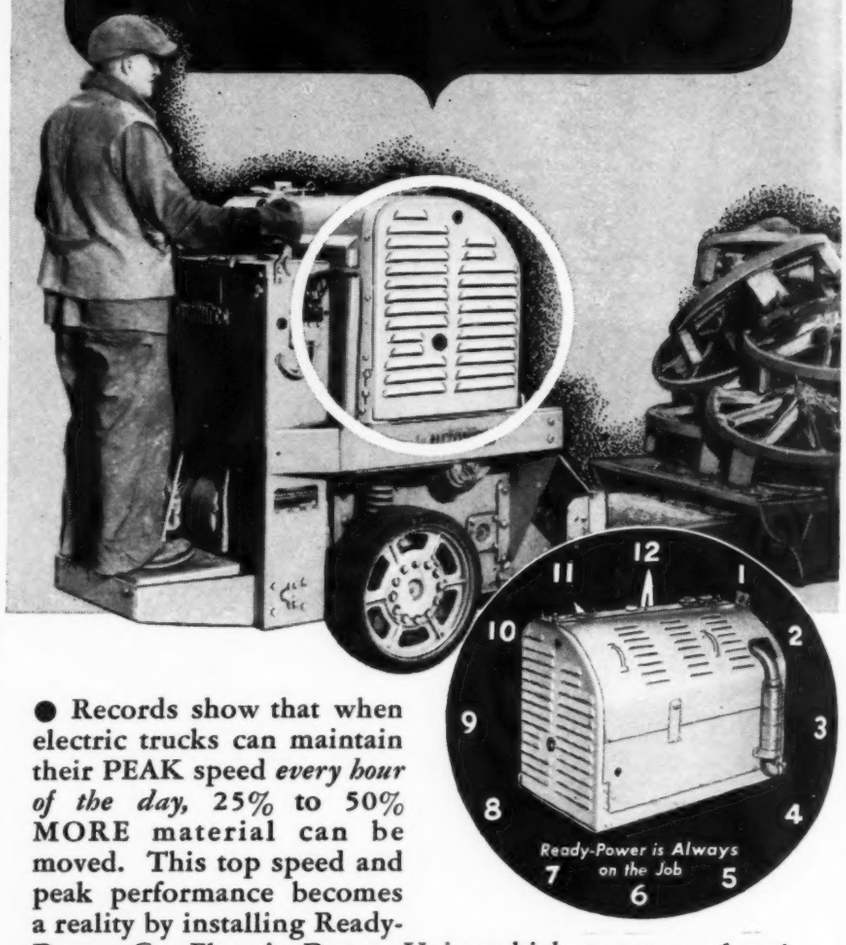
- No traffic delays while placing
- High bond strength
- Easy to apply
- Lasting toughness

DURA-TRED COMPANY

363 N. Central Park Blvd. Chicago 24, Ill.

with READY-POWER Electric Trucks Will Work at FULL SPEED

Every Day . . . All Day Long



● Records show that when electric trucks can maintain their PEAK speed *every hour of the day,* 25% to 50% MORE material can be moved. This top speed and peak performance becomes a reality by installing Ready-Power Gas-Electric Power Units which generate electric power right on the truck chassis. Thus your electric trucks are always ready to go . . . ready to work at top speed for unlimited hours. Ready-Power Units are sized to provide ample power for any job and they can be installed on any make truck. Reduce costs, save time and manpower by converting your present trucks to Ready-Power. Specify Ready-Power on new truck purchases.

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

The name to remember for your Shop Equipment.

Do You . . .

have a copy of the HALLOWELL *catalog?*

In this catalog "Hallowell" Ready-made Shop Equipment of Steel is featured more completely than ever before. A wide range of sizes and types of equipment includes: Ready-made Work Benches, Stools, Trucks, Tool Stands, Foreman's Desks, and more than 1300 interchangeable parts designed to fill almost every need in industry.

Write for a copy of this "Hallowell" Catalog and keep it where you can refer to it quickly when your shop needs labor-saving and money-saving equipment.

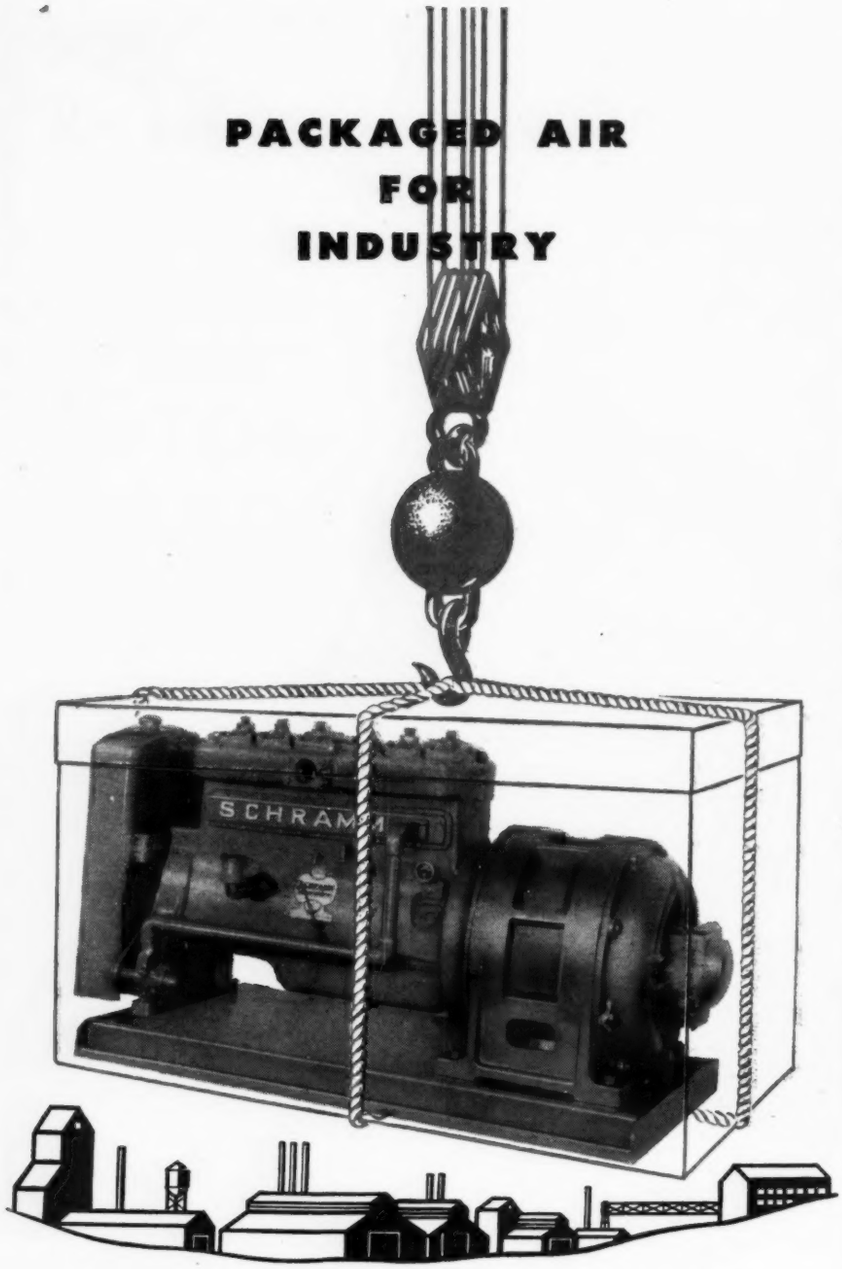
"Hallowell" and "Unbrako" Products sold through distributors only.

OVER 43 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 546 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

PACKAGED AIR FOR INDUSTRY



Packaged air . . . when and where you need it . . . is always there when you have a stationary or portable Schramm Compressor. Designed for rugged, reliable duty, Schramm Compressors give a continuous flow of air with a minimum of maintenance. Of special advantage to the Industrial Engineer are these Schramm Compressor features:

1. **Completely watercooled to provide ideal performance in winter as well as summer.**
2. **Main bearings for every cylinder.**
3. **Mechanical Intake Valve.**
4. **More cylinders and lighter parts.**
5. **Forced feed lubrication.**

Make your compressed air problems easier by using Schramm Air Compressors. Write today for construction details on these rugged, reliable units.

SCHRAMM INC.

THE COMPRESSOR PEOPLE

WEST CHESTER

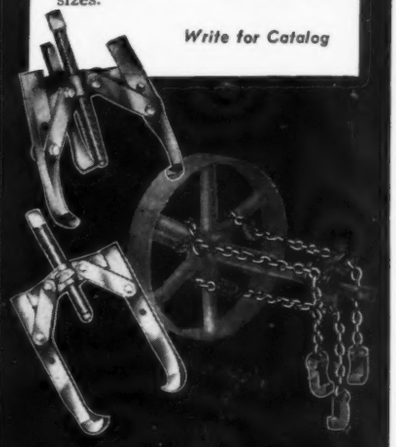
PENNSYLVANIA

ARMSTRONG-BRAY

GEAR and WHEEL PULLERS

Essential tools for the maintenance and repair of machinery, motors, engines and shafting. They remove gears, pulleys, sheaves, bearings, sleeves, etc., easily and quickly, without battering or breakage. **STEEL-GRIP** Rigid Arm Pullers in standard and special types **CHAINGRIP** Pullers, that reach-in considerable distance from the end of shaft; automotive pullers, etc.—41 types and sizes.

Write for Catalog



ARMSTRONG-BRAY & CO.

5338 Northwest Highway, Chicago 30, U.S.A.

SAFETY IS SIMPLE *but* PROFITABLE

QUESTION: For what are compensation payments made?

ANSWER: On-the-job accidents.

QUESTION: How can they be reduced or eliminated?

ANSWER: By equipping workers with top quality safety equipment.

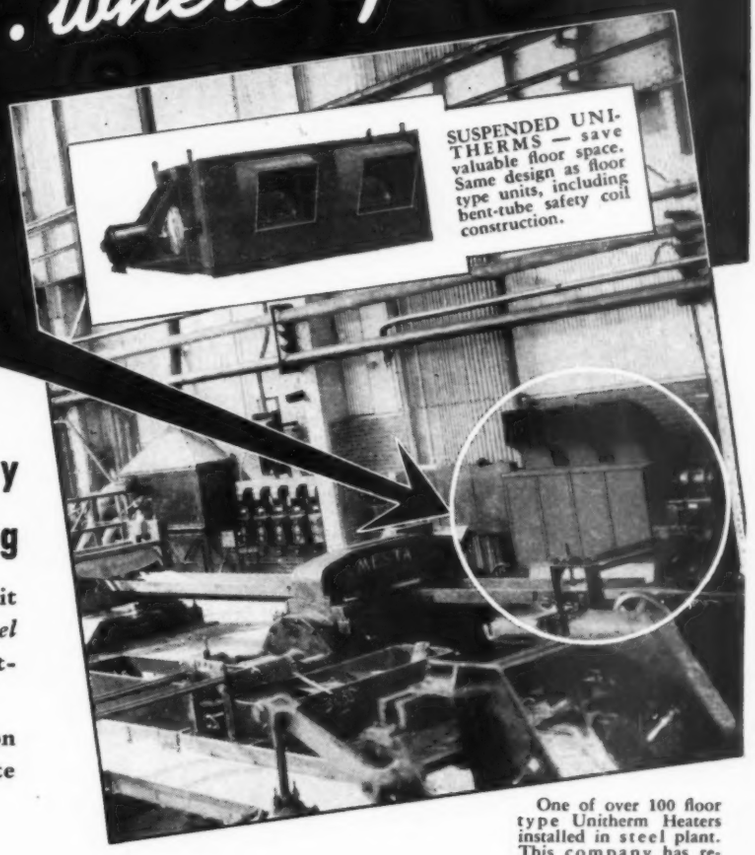
Simple, isn't it? Just as simple as ordering *Strauss* when you're in the market for the finest, safest, and most comfortable safety belts, hats and caps available anywhere.

Strauss products are manufactured by the Safety Division of Portable Products Corp. Their reputation for over fifteen years of unexcelled safety and satisfaction speaks for itself. The people who use Strauss products know they *really are safe.*

PORTABLE SAFETY DIVISION
Portable Products Corporation

425 Blvd. of the Allies Pittsburgh 19, Pa.

HEAT... where You Need it — and when You Need it!



SUSPENDED UNITHERMS — save valuable floor space. Same design as floor type units, including bent-tube safety coil construction.

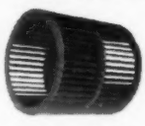
One of over 100 floor type Unitherm Heaters installed in steel plant. This company has reordered eight times. Yes, Clarage Unitherms do the job!

Use CLARAGE Unitherms in any Type of Industrial Building

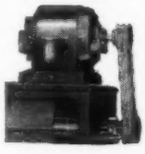
Besides cutting fuel costs, Clarage Unit Heaters will help your plant maintain *top-level production* so dependent upon healthy, comfortable temperatures.

If you're still using wasteful coils, cast iron radiation, or obsolete unit heaters — investigate the features of our Unitherm Units!

FEATURES!



Centrifugal Fans



V-belt Drive

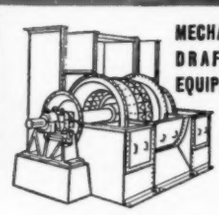
Adjustable Square Outlets

(1) Syncrotherm Control (exclusive improvement) maintains uniform temperatures with relatively LOW TEMPERATURE AIR — lower operating costs. (2) Centrifugal fans — one for each heater outlet — delivering heat over wide areas. (3) Square outlets for easy adjustment to four directions of heat flow. (4) V-belt drive insures quieter operation, greater flexibility of fan speed. (5) Every part accessible by removing front or back section of casing . . . Built in liberal range of sizes, operating on steam or hot water.

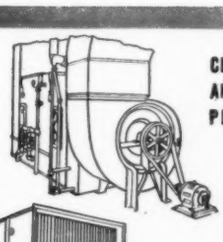
And for Smaller Jobs

Clarco Unit Heaters (at right) are for small space heating, and for "spots" where more heat is needed than present equipment can supply. Exceptionally quiet — ideal for offices and stores as well as factory service. Wide range of sizes, using steam or hot water.

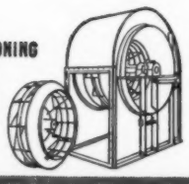
SOME OF OUR OTHER PRODUCTS



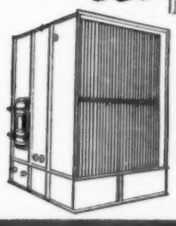
MECHANICAL DRAFT EQUIPMENT



CENTRAL STATION AIR CONDITIONING PLANTS



AIR CONDITIONING AND VENTILATING FANS



AIR WASHERS

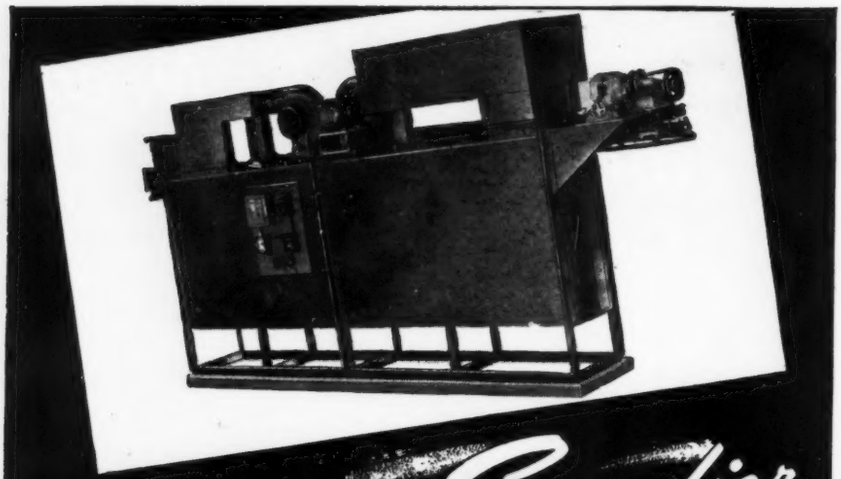
Sorry, but the large volume of orders already accepted prevents deliveries for 1946 heating season. We would, however, appreciate an opportunity to figure your future unit heater requirements.

CLARAGE

FAN COMPANY

Kalamazoo, Michigan

APPLICATION ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



Speedier COLD and HOT AIR DRYING of METAL PARTS

Faster drying of metal parts on racks is accomplished with the use of the new OPTIMUS Continuous Type Drying Machine. Ideal for handling loaded racks continuously after plating, or after any water solution dip. Drying time runs 4 to 6 minutes.

This new OPTIMUS Dryer is used largely as a cold air and hot air dryer. Cold air system includes a blower and a series of nozzles. Hot air system includes an air heater, re-circulating blower, a damper to adjust the mixture of atmospheric and re-circulating air, and necessary nozzles.

It can be used as a single stage dryer, or it can handle a number of successive operations, alkaline, acid, or neutral. Enclosed design of machine permits efficient ventilation through exhaust blower connection when desired. Can be heated by steam, gas or electricity.

An OPTIMUS Plan for the mechanized handling of your metal parts through washing, rinsing and drying, can help you save labor, reduce rejects and increase your production.

SEND FOR

Your copy of new bulletin

"Cleaning Metal Parts before and after finishing"

DEPENDABLE OPTIMUS DETERGENTS
for every metal cleaning equipment operation.

OPTIMUS EQUIPMENT COMPANY
ENGINEERS AND MANUFACTURERS
139 CHURCH STREET, MATAWAN, N. J.

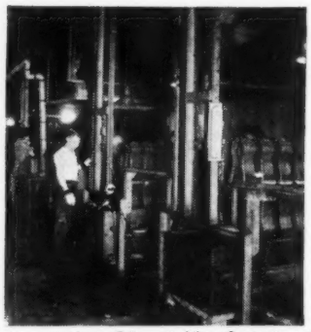
STANDARD AND SPECIAL TYPES OF EQUIPMENT FROM THE SMALLEST TO THE LARGEST SIZES FOR A WIDE VARIETY OF OPERATIONS.

OPTIMUS EQUIPMENT
FOR WASHING · RINSING · PICKLING AND DRYING OF METAL PARTS

Silicone News

DC SILICONES

DC Antifoam A In Neoprene Latex Solution



Photo, courtesy Edmont Manufacturing Co.

eliminates rejects
improves appearance
increases production
of Edmont rubber coated
fabric work gloves

The surface tension of the neoprene latex solution used in manufacturing the rubber coated fabric work gloves made by the Edmont Manufacturing Co. of Coshocton, Ohio, was not sufficiently reduced by the foam inhibitor previously used to prevent air from being entrapped in the dipped film. Consequently, production costs were increased by the number of gloves rejected because of air bubbles in the coating.

Since using DC Antifoam A in a concentration of about 1 part per 12,000 parts of dry rubber solids, the surface tension has been greatly reduced, rejects have been practically eliminated, production has been increased and the appearance of the product has been greatly improved.

Again DC Antifoam A has solved a costly manufacturing problem caused by foaming. Perhaps you have such a problem. If so, it is certainly worth trying DC Antifoam A, the new Dow Corning Silicone foam inhibitor useful in a very wide variety of aqueous solutions and emulsions. More information about DC Antifoam A is contained in leaflet No. E 6-3.

OTHER DOW CORNING SILICONE PRODUCTS equally useful in cutting production and maintenance costs, are described in catalog No. E 1-3.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN
Chicago Office: Builders' Building
Cleveland Office: Terminal Tower
New York Office: Empire State Building
In Canada: Dow Corning Products Distributed by Fiberglas Canada, Ltd., Toronto

Dow Corning
FIRST IN SILICONES

"Temper Is Unaffected . . . Output Is Up 200%!"

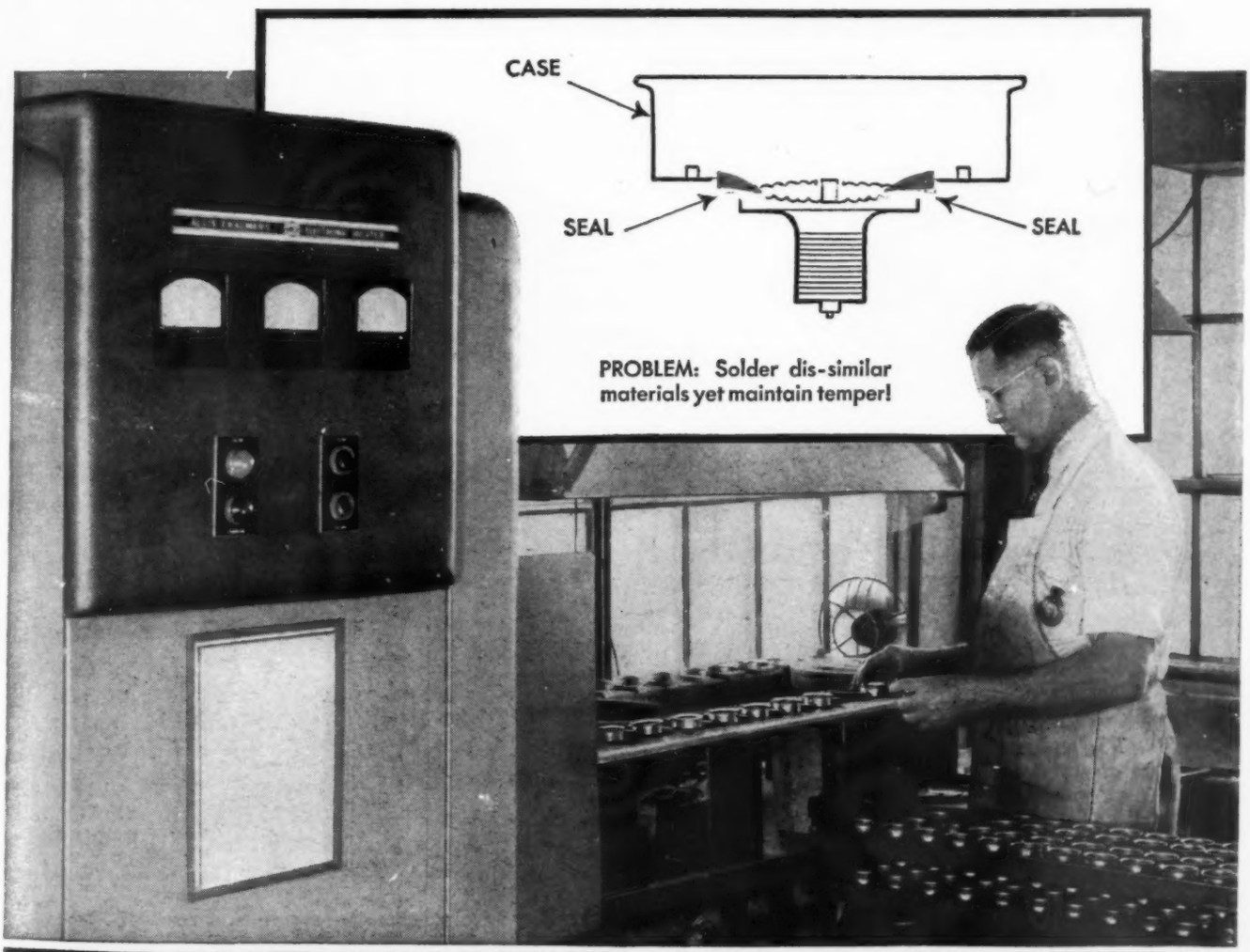
Says Mr. Warren Hastings, Plant Manager, ROCHESTER MFG. CO.

"MAINTAINING TEMPER of materials during soldering operations used to be a real test for *our* tempers! But now that we've installed our new Allis-Chalmers Induction Heater, we're able to apply just the *right amount* of heat to form an air-tight seal between our assembled parts. Not only does the temper of the materials remain *unaffected,* but now the operation is so simple that production *tripled,* and one man handles the entire job!"

These results are *typical* of how electronic induction heat solves problems of soldering, brazing and hardening metals . . . does better, faster work at lower cost!

If you have a *similar* job to do, or one which you *think* can be improved, why not let A-C's *experts* help you. Send samples to our modern process laboratories for careful analysis, estimates of per-piece production, and equipment costs. No obligation. Meanwhile, write for our *educational* bulletin 14B6430. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2112



ALLIS CHALMERS

One of the Big 3 in Electric Power Equipment
Biggest of All in Range of Industrial Products

INDUCTION HEATERS

Serving Industrial America

Hein-Werner Hydraulic Jacks are serving industrial plants at many time and labor saving jobs. For maintenance work or production line operations—for pressing, bending, moving or lifting—H-W Hydraulics are super-powerful, easy-operating and absolutely dependable. Every Hein-Werner Jack is factory-tested at 1½ times its rated capacity. Available in models of 3, 5, 8, 12, 20, 30 and 50 tons capacity. For details, consult your nearest industrial supply distributor, or write us.

Hein-Werner
HYDRAULIC JACKS
Built Right
Priced Right

HEIN-WERNER MOTOR PARTS CORP., Waukesha, Wis.

QUICK-DRY
(better grade)
GRANULAR MINERAL PRODUCT

PREVENTS THIS

It's Fireproof and Skidproof

All-purpose QUICK-DRY absorbs oil, water, grease, and other liquids with amazing speed. Good on all kinds of floors around machines, pumps, aisles, garages, etc. Not harmful to floors, hands, shoes, clothing, or elsewhere.

Approved by National Board of Fire Underwriters

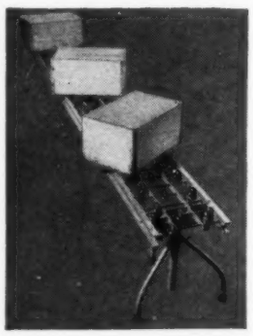
100 lbs, 5¢ lb.	1000 lbs, 3¾¢ lb
250 lbs, 4¾¢ lb	2000 lbs, 3¢ lb
500 lbs, 4½¢ lb	4000 lbs, 2¾¢ lb

PROMPT SHIPMENTS FROM STOCK

NATIONAL SAWDUST CO.
INCORPORATED
60 North 6th St. Brooklyn 11, N. Y.

INDOORS or OUTDOORS
SPEEDWAYS
SAVE LABOR, TIME, MONEY!

On production lines, in warehouses, on loading platforms, move your cases, cartons, crates, and boxes this modern, efficient way—no maintenance, no electricity or upkeep. Sections interlock—no tools needed to install.



ALL PURPOSE
•
LOW COST
•
LIGHT WEIGHT
•
NO TOOLS REQUIRED

STANDARD MODELS: 5 & 10 ft. straight sections—12, 15 or 18 inches wide with 6, 8 or 10 wheels per foot—45° & 90° curves.

Write for FREE, 2 color, illustrated folder.

Visit our Booth No. 407, Material Handling Exposition, Cleveland, January 14-17.

SPEEDWAYS
CONVEYORS, INC.

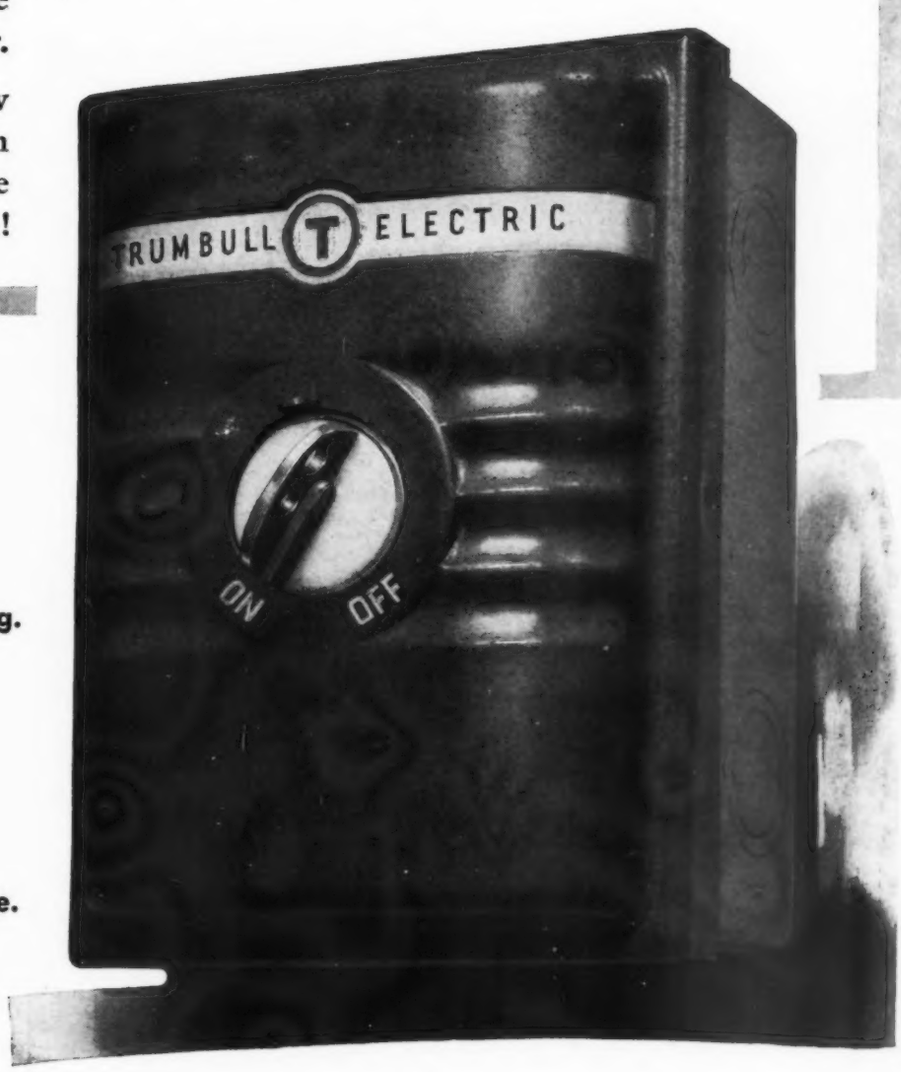
1241 Niagara St. Buffalo 13, N. Y.

Represented by experienced Material Handling Equipment Engineers in principal cities.

"LET'S TAKE THE SIMPLE, INEXPENSIVE TYPE D SWITCH • • AND MAKE IT BETTER THAN IT HAS EVER BEEN MADE BEFORE"

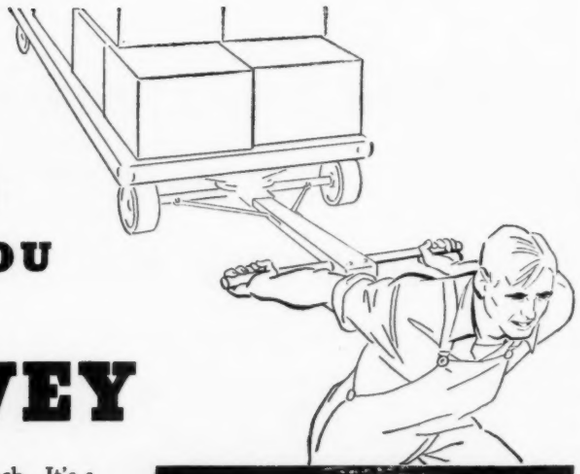
In just those words more than a year ago, a Trumbull team of design and production engineers set to work to give the Electrical Industry's basic low-cost enclosed switch "the works". How well they have succeeded is for YOU to decide. But we know in advance what your verdict must be. For, not only is this an outstanding example of American postwar ingenuity in making a product far superior in quality and performance at low cost . . . it is also the handsomest, simplest, most easily wired, sturdiest and best engineered Type D Switch you have seen . . . or we either.

Now coming off our new streamlined production lines mighty fast. Place your orders, Gentlemen!



- *Front* operated.
- Locking provision in "off" position.
- Straight through wiring.
- Back mounted.
- More wiring space.
- Switch unit removable.
- Very compact.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY
PLAINVILLE, CONNECTICUT
OTHER FACTORIES AT NORWOOD, OHIO • SAN FRANCISCO • LOS ANGELES • SEATTLE



WHY PULL WHEN YOU CAN CONVEY

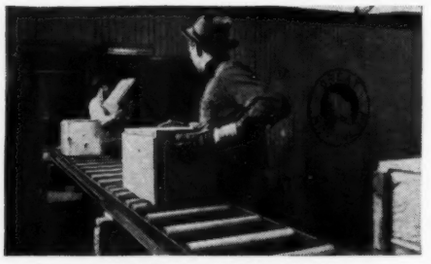
PULLING costs too much. It's a waste of time and manpower. Conveyors can stop this waste. Investigate the use of conveyors. Conveyors handle a wide variety of parts, packages, units, cans, bottles, barrels, bundles, drums and boxes. Available in light, medium or heavy-duty types — portable or stationary — as systems, sections or units — power or gravity fed, they give you remarkable savings in time, money and manpower conservation. They relieve confusion and congestion. Standard Conveyor Company has the experience and facilities to engineer, recommend and furnish the right type of conveyor for your particular needs.

Write today for catalog No. FM-126 "Conveyors by Standard" — a ready reference on conveyor types and systems.

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

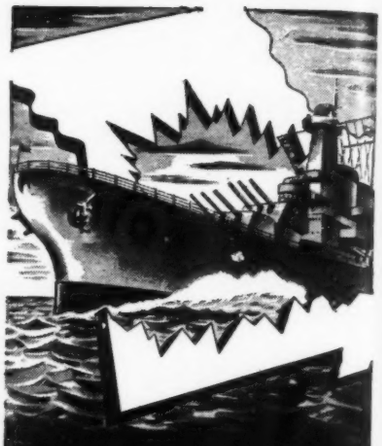
PRODUCTION LINES
Conveyors keep production moving without interruption.

WAREHOUSES
Handibelt portable conveyor helps pile cartons higher and faster in a warehouse.



LOADING PLATFORM
Cases move fast into cars on sectional roller conveyors — with less manual handling.

ROLLER · BELT · SLAT · PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS



MIGHTY MISSOURI

A mighty warship steams across the oceans of the world . . . the U.S.S. MISSOURI. And the name she bears so gallantly is an appropriate one, for the heritage of the state of Missouri is progress.
The men who are captains of industry recognize these advantages native to Missouri:

Low taxes

2,251 new corporations first nine months of 1946

Skilled native labor

Excellent transportation facilities

Rich markets

Wealth of natural resources

Low cost power

350 communities eager to cooperate

Whether you're planning a parent plant or branch factory, let the "show me" state show you its full resources.

Specialized, confidential service to industrialists. Write direct: Missouri State Division of Resources & Development, Dept. N58, Jefferson City, Mo.

THE STATE OF MISSOURI
In The Heart of America

Patented and
Patents Pending

From the compact Model 2½...

—to the hard-hitting Model 20...

every Kidde Portable works the same fast, simple way...

AIM AT THE FIRE — PULL THE TRIGGER!

With *any* size *Kidde* Carbon Dioxide Portable, the *natural* way to fight a fire is the *right* way too! Simply aim the nozzle at the flames —then press the trigger. It's just as easy as that.

The dry, clean carbon dioxide from *Kidde* Portable Extinguishers is deadly to fires in flammable liquids or electrical equipment—but harmless to everything else. No danger of shock when used on electrical equipment. No after-fire mess to clean up.

Carbon dioxide capacities: 2½, 5, 10, 15 and 20 pounds. Write for full information.

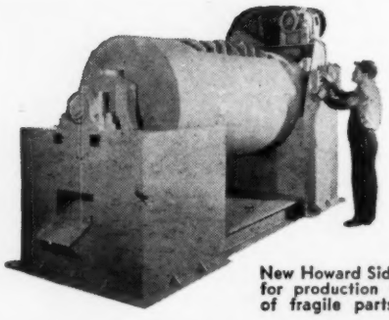
Walter Kidde & Company, Inc., 1232 Main Street, Belleville 9, New Jersey

Kidde

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

HOWARD MACHINES DEBURR THE MOST FRAGILE PARTS

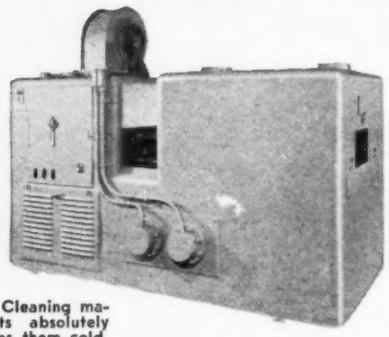


When someone tells you it can't be done, that's the time to consult HOWARD. The machine at the left is an example: they said mass-production deburring without nicking couldn't be done. This New Howard Machine does it. Send us your parts for analysis—we'll come up with the right answer everytime.

New Howard Side Loading Tumbling Mill for production tumbling and deburring of fragile parts WITHOUT NICKING!

HOWARD Does Finer PRECISION CLEANING

Washing small precision parts thoroughly clean and discharging them at room temperature was the recent challenge given Howard by a large ball bearing manufacturer. The Howard design, combined Wash, Compressed Air Blow-off and Cooling to obtain excellent results, far better than requested.



No. 354. Conveyor Cleaning machine washes parts absolutely clean and discharges them cold, ready for immediate inspection!

GIVE US YOUR HARD JOBS!

Consult Howard Engineers on those "it-can't-be-done" jobs. HOWARD experience and skill have designed and built many machines that were too tough for anyone else. Send us your parts for free analysis and processing. We'll give you a complete report, with recommendation on methods and equipment. We'll give you the answer to your problem.

MACHINERY FOR

Tumbling — Washing
Pickling — Quenching
Deburring — Drying
Burnishing

WRITE FOR NEW 48-PAGE CATALOG

HOWARD

ENGINEERING & MANUFACTURING CO.

2242 Buck St. Cincinnati 14, Ohio

MAILING LISTS THAT WORK...

McGraw-Hill Industrial Mailing Lists are a direct route to today's purchase-controlling executives and technicians in practically every major industry.

These names are of particular value now when most manufacturers are experiencing constantly increasing difficulty in maintaining their own lists.

Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance during this period of unparalleled changes in industrial personnel. These lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nation-wide field staff, and are maintained on a twenty-four hour basis.

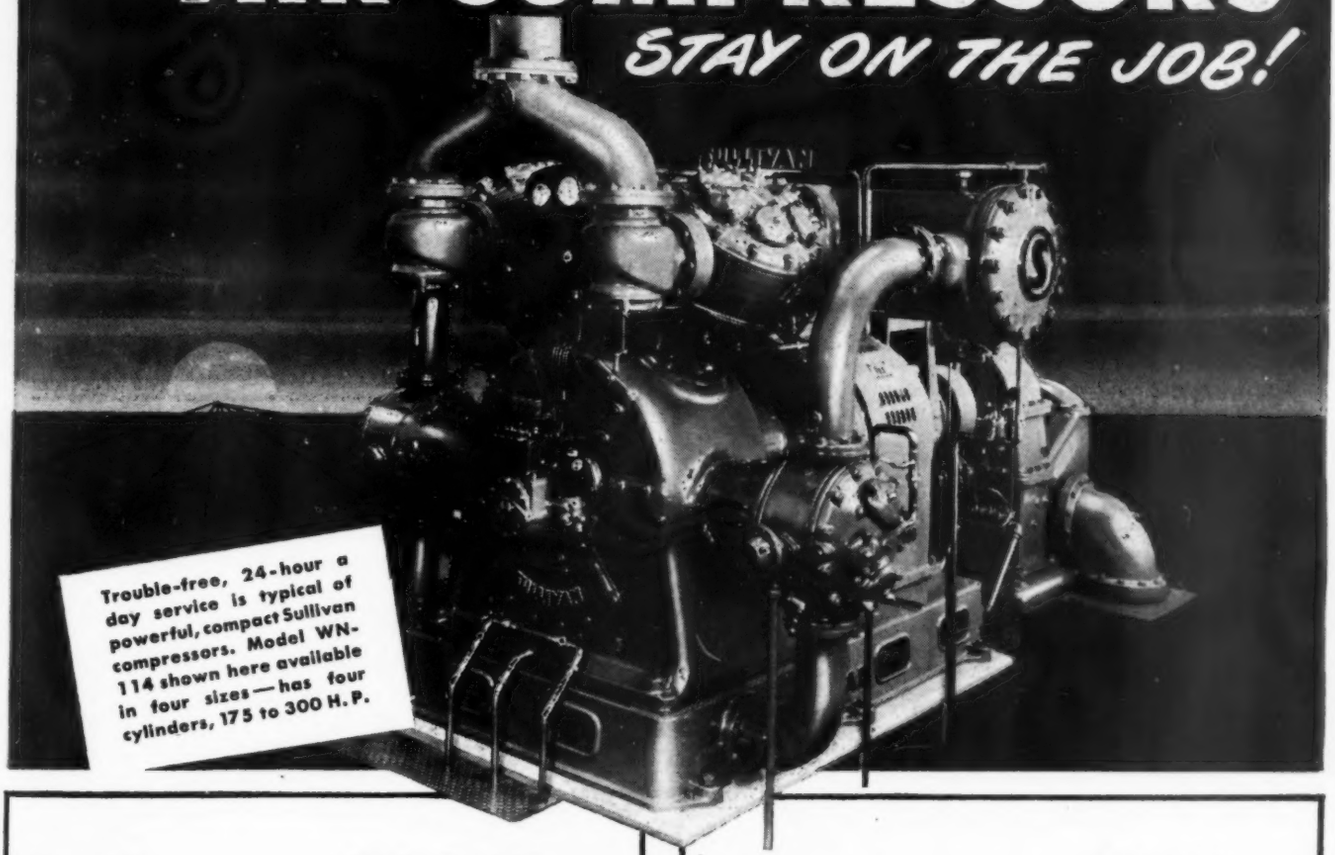
Investigate their tremendous possibilities in relation to your own product or service. Your specifications are our guide in recommending the particular McGraw-Hill lists that best cover your market. When planning your industrial advertising and sales promotional activities, ask for more facts or, better still, write today. No obligation, of course.

McGraw-Hill Publishing Co., Inc.

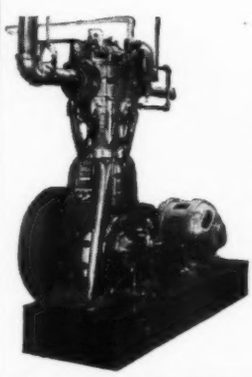
DIRECT MAIL DIVISION

330 WEST 42nd STREET NEW YORK, 18, N. Y.

NIGHT AND DAY
SULLIVAN
SERIES 100 - HEAVY DUTY
AIR COMPRESSORS
STAY ON THE JOB!



Trouble-free, 24-hour a day service is typical of powerful, compact Sullivan compressors. Model WN-114 shown here available in four sizes — has four cylinders, 175 to 300 H. P.

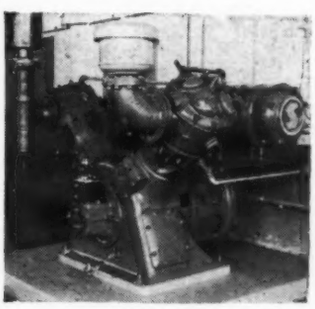


WG-9 AIR COMPRESSOR

Saves space and money

Single stage, double acting, water-cooled, vertical compressor that needs only a simple block foundation. Size with sheave only 3' x 2' 10" x 5' 10" high. Cylinder liners replaceable on job.

WRITE FOR BULLETIN



WN-112 COMPRESSOR

Two cylinder, V-vertical type. Double acting, water-cooled "Dual-Cushion" valves, full force feed lubrication, removable cylinders and crosshead guides. Six sizes—60 to 150 H. P.

WRITE FOR BULLETIN

SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

Consult a Joy Engineer

WSD 1-611

For Floors that are Safer to walk on ...will last longer

INLAND 4-WAY FLOOR PLATE

Available from Leading Steel Warehouse Distributors

Write for Catalog

INLAND STEEL COMPANY
38 S. Dearborn Street Chicago 3, Ill.
Sales Offices: Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul

TAILORED FOR THE MAN ON THE JOB

Fit For Faster Work

Royal Archer Rubberized Work Clothing is engineered to make *every* motion on *every* job a free and easy movement. Doesn't hamper or bind. Assures more efficiency, fewer man hours lost, a lower accident rate.

Archer waterproof fabrics are coated to be resistant to alkalies, acids, oils, abrasives, and most chemicals.

Special apparel designed for special needs; also a wide range of coated fabrics for many industrial applications, including Archerite plastic films and coatings.

Ask your Industrial Wholesaler about Royal Archer Work Clothing, or write direct to Archer Rubber Co., Milford, Mass. — Makers of Quality Rubberized Goods Since 1907.

ARCHER RUBBER COMPANY
ROYAL ARCHER

Rubberized
WORK CLOTHING

One-Man Operated

AIR CONTROLLED

ORTON

ONE MAN

AERO-CRANE

OPERATED, TRAVELED AND STEERED FROM THE CRANEMAN'S SEAT

- AUTO TRUCK MOBILITY
- ANTI-FRICTION BEARINGS
- AIR-OPERATED CLUTCHES
- SAFETY HOIST BRAKES
- BALANCED WEIGHT
- SIMPLE, POWERFUL DESIGN
- EIGHT MODELS

WITHOUT fatigue, and all day long, *one man*, with an Aero-Crane, does the work of 4 or 5 men—gets your material onto the stockpile and out again at minimum cost. With the Aero-Crane one man handles 200 to 1000 lb. loads that eat up the time of a yard crew.

Designed for rapid yard work, the Aero-Crane goes anywhere a truck can go. You can travel it light or loaded with boom in any position. Tough-built, with anti-friction bearings throughout, electric welded construction, non-burn clutches, Air-controls, Aero-Crane keeps going free of breakdowns—pays for itself in saved man-hours.

Built in a range of eight models. Capacities of 3,500 to 60,000 lbs. at 12 foot radius. Diesel or gasoline powered.

CATALOG 73 GIVES THE DETAILS. SEND FOR IT.

SENSITIZED

POWER

ORTON CRANE & SHOVEL CO.

608 S. DEARBORN ST., CHICAGO 5, ILL.

INDUSTRIAL CONSULTANTS

N. H. ABRAMS & ASSOCIATES
Industrial Engineers-Management Counselors
PLANT LAYOUT
MATERIALS HANDLING
COST & PRODUCTION CONTROL
METHODS & PROCEDURES
MARKET RESEARCH & ANALYSIS
1037 N. Pennsylvania Street Indianapolis 4, Ind.

ASSOCIATED ENGINEERS, Inc.
Joseph C. Lewis, *President*
230 E. Berry St., Fort Wayne 2, Ind.
Management Consultants
Engineering • • Architecture • • Accounting
Organization • • Methods • • Costs

WALTER BEERMAN
Processing Processes
Manufacturing Processes
332 West 46 Street
NEW YORK 19

BRONSON, SHYBEKAY & ASSOCIATES
Sales and Management Consultants
Analysis of business problems, salesmanship and sales managers, executive, supervisor, and foreman-ship training, wage administration, cost control, scientific selection, industrial engineering. Management, supervisor, and production problems.
703 Third Avenue South, Minneapolis, Minnesota

WM. W. CARLTON & ASSOCIATES
Engineers and Architects.
Investigations, Reports, Appraisals.
Design, Construction Superintendence,
Complete Plants and Installations.
Wm. W. Carlton Geo. F. Frankenberger
Wm. H. Junker Waldemar A. Lensky
Cincinnati 14, Ohio

WALLACE CLARK & COMPANY
Consulting Management Engineers
Since 1920
Planning for Research and Development, Sales, Engineering, Production, Finance, Industrial Relations, Overall Management.
521 Fifth Avenue New York 17, N. Y.

GREGORY M. DEXTER
Consulting Industrial Engineer
Business Management Problems
32 Fenimore Road, Scarsdale, N. Y.

Independent Judgment—

These consultants specialize in management problems and in the devising of better management methods. They render an invaluable type of service that cannot be secured from any other source—counsel based on wide experience and representing an outside point of view, unbiased and free from tradition, internal organization or personal interest.

Thus the business executive achieves top efficiency when he chooses an independent consultant, exercising independent judgment at all times.

ELECTRONIC ASSOCIATES, Inc.
Specialists
in
Industrial Electronics
61 Brighton Ave. Long Branch, N. J.

THE EMERSON ENGINEERS
Management Counselors Since 1899
Plans — Controls — Incentives
for
Profit Making Management
30 Rockefeller Plaza, New York 20, N. Y.

INDUSTRIAL RELATIONS ASSOCIATION
Consultation Service
All phases of labor relations, wage structure and administration, personnel policies, wage and hour regulations, etc.
Suite 506, First National Bank Building
Cincinnati, 2, Ohio

METHODS ENGINEERING COUNCIL
H. B. MAYNARD, President
Consultants in Industrial Management
TIME AND MOTION STUDY — JOB EVALUATION
WAGE INCENTIVE — MERIT RATING
INSTALLATIONS — TRAINING
822 Wood Street — Pittsburgh (21), Pa.

ALLAN H. MOGENSEN
Training in Work Simplification
330 W. 42nd Street
NEW YORK CITY

NORRIS & ELLIOTT, INC.
Management Engineers
WAGE INCENTIVE
JOB EVALUATION
MOTION-TIME STUDIES
COST & PRODUCTION CONTROL
New York, N. Y. Columbus, Ohio Chicago, Ill.

PATENTS, INC.
Consulting Engineering and Patent Development Work
1302 South Broad Avenue New Orleans 15, La.

DONALD THOMPSON
Industrial Planning
Efficient Utilization of Space in Plant Layout Site Planning, Building Determination, Equipment Arrangement. Planning Only—No Construction Drawings.
608 Atlas Building, Charleston, W. Va.

TRAINING WITHIN INDUSTRY ASSOCIATES, INC.
Management Development
Supervisory and Employee Training
Job Relations—Job Methods
Job Instruction
Suite 815, 100 North LaSalle Street, Chicago 2, Ill.

WALTERS ENGINEERING CO.
INDUSTRIAL ENGINEERS
Consultants • Designers
FOX THEATRE BUILDING
DETROIT 1, MICHIGAN

CHARLES H. WELLING & CO.
Industrial Consultants
EXCLUSIVE NEW PRODUCTS
FOUND FOR MANUFACTURERS
BY PROVEN METHODS
52 Vanderbilt Avenue New York 17, N. Y.

H. H. WHITCOMB
Business Engineers
SPECIALIZING IN SIMPLE PRODUCTION, PLANNING AND FACTORY COSTS SYSTEMS TO FIT ALL SIZES AND KINDS OF BUSINESS AT REASONABLE PRICES.
141 Milk Street • Boston, Mass.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of FACTORY MANAGEMENT AND MAINTENANCE published Monthly at Louisville, Kentucky, for October 1, 1946.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of FACTORY MANAGEMENT AND MAINTENANCE, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the name and address of the publisher, editor, managing editor, and sales manager is: Publisher, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 18, N. Y.; Editor, L. C. Morrow, 330 West 42nd Street, New York 18, N. Y.; Managing Editor, L. K. Urquhart, 330 West 42nd Street, New York 18, N. Y.; Sales Manager, H. E. Hilty, 330 West 42nd Street, New York 18, N. Y.

2. That the owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City. Stockholders holding 1% or more of stock: James H. McGraw, 330 West 42nd Street, New York City; James H. McGraw, Jr., 330 West 42nd Street, New York City; James H. McGraw, Jr., Curtis W. McGraw and Edwin S. Wilsey, Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw, 330 West 42nd Street, New York City; Edwin S. Wilsey and Curtis W. McGraw, Trustees for James H. McGraw, 3rd, Madison, New Jersey; Curtis W. McGraw, 330 West 42nd Street, New York City; Donald C. McGraw, 330 West 42nd Street, New York City; Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas St., La Jolla, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

J. A. GERARDI, Secretary.

McGraw-Hill Publishing Company, Inc.

Sworn to and subscribed before me this 24th day of September, 1946.

[SEAL] ELVA G. MASLIN.

(My commission expires March 30, 1948.)

CHECK
with
BUNELL

It's an organization of men and machines to serve industry in the designing and building of special machines, tools, metal stamping dies, jigs, and fixtures.

Also, it's an organization that offers an economical engineering check-up service made by technical men to review equipment and processes in the individual plants of customers—a man-Friday service of simplification and help.

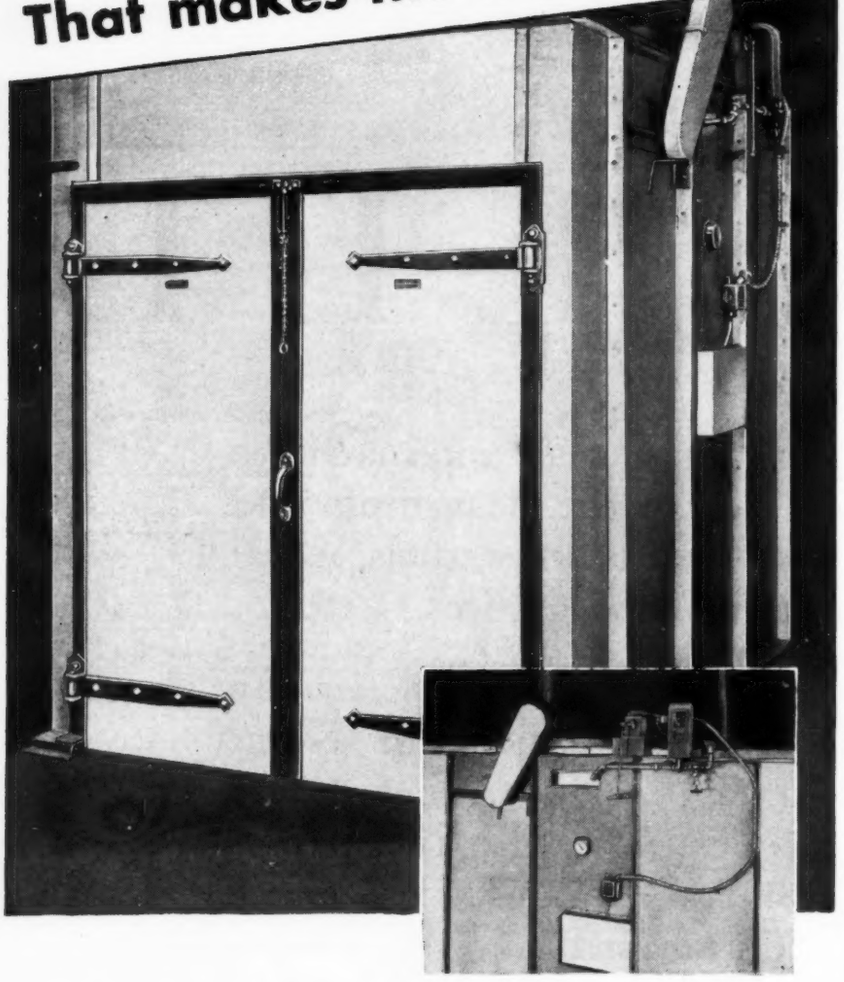
It's an organization geared, also, to precision production of contract manufacture of parts and assemblies.

The BUNELL Machine & Tool Company

1601 East 23d Street

CLEVELAND 14, OHIO

It's "KNOWING HOW" That makes the difference



● Note the special features in this Goergen-Mackwirth Brick Drying Oven:

... Doors Strongly Reinforced Internally—Prevents sagging or warping with use. Extra long hinges are sufficiently strong to carry the weight.

... Unit Panels—Permit oven to be easily taken down, moved, stored or re-erected elsewhere. Each panel is complete in itself.

... All Parts Readily Accessible from either the top or inside of oven.

... Standing Seams—for maximum structural side-wall strength.

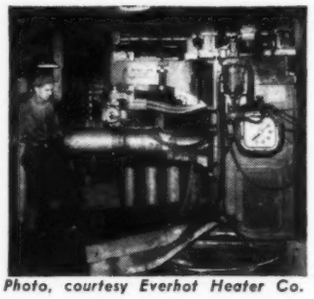
Goergen-Mackwirth are specialists in the movement and control of air. Leading industries call on their engineering knowledge and experience when installing Ventilating Systems, Exhaust Systems, Dryers, Paint Spray Booths, Air Conditioning Systems and similar equipment. Send us YOUR problem and we'll work out the best way to solve it.

Goergen-Mackwirth
COMPANY, INC.
817 SYCAMORE STREET, BUFFALO 12, N. Y., Phone: CLeveland 6661

Silicone News

DC SILICONES

DC Silicone Insulation enables transformers to take overloads



Photo, courtesy Everhot Heater Co.

Overloads and moisture caused frequent failure of the air cooled, 150 k.v.a. transformer in this welding machine used by Everhot Heater Company of Detroit. Welding 38 to 60 inch lengths of 10, 11, 12 and 13 gauge steel at a rate of 23 to 35 inches per minute in a machine having a throat of only 30 inches created more heat than conventional organic insulation could stand. Add to that the presence of moisture common to such welding operations, and you have service conditions far too severe for conventional insulation, but well within the range of DC Silicone Insulation.

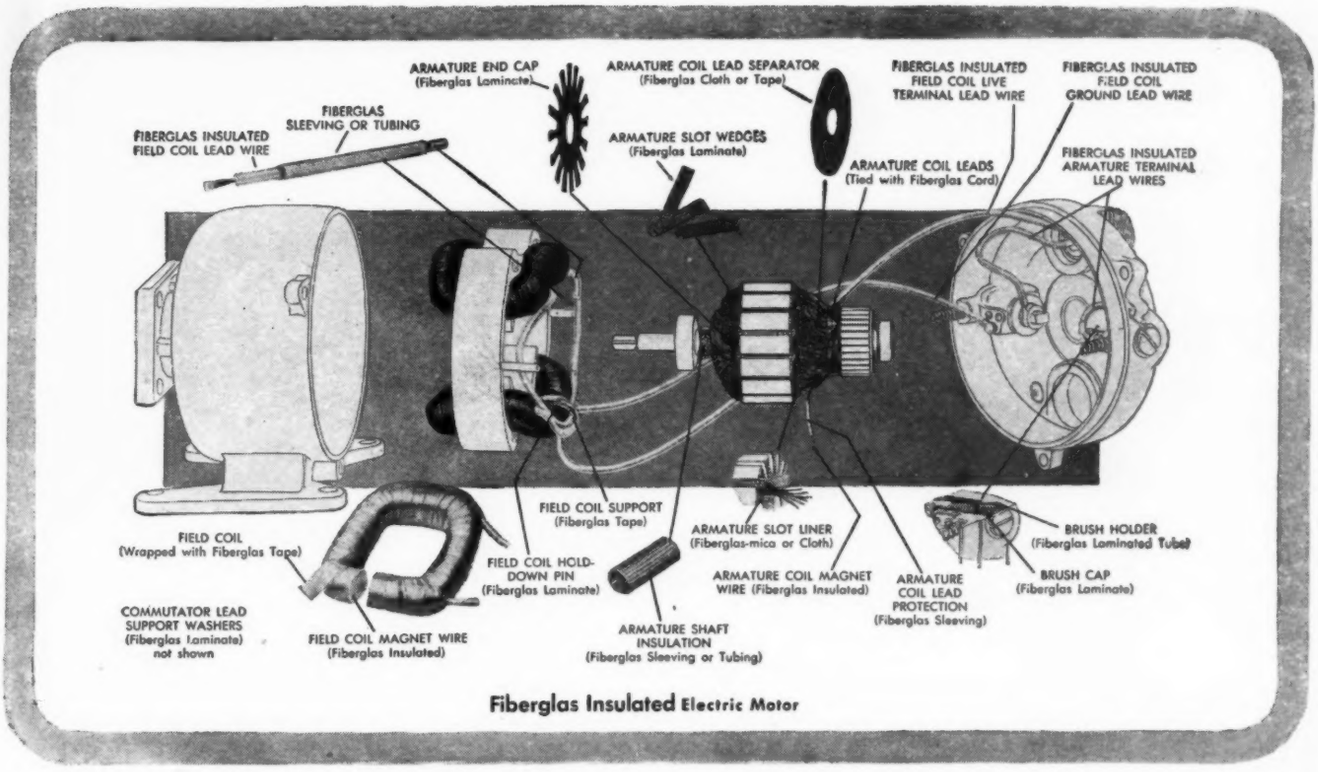
The only alternatives to frequent failure under such difficult service conditions are new equipment designed for heavier duty or Silicone Insulation. Everhot Heater Company chose to have the coils of their welding machine rewound with Silicone Insulation by National Electric Welding Machine Co. That choice has resulted in a very considerable saving.

Rewinding present equipment with DC Silicone Insulation gives it greater heat and moisture resistance than it had to begin with. That means more reliable operation and longer service and it saves capital investment. It's worth finding out about.

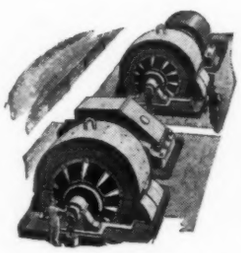
Instructions on how to apply DC 996, the Silicone insulating varnish for electric machinery, are given in pamphlet No. E 3-3.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN
Chicago Office: Builders' Building
Cleveland Office: Terminal Tower
New York Office: Empire State Building
In Canada: Dow Corning Products Distributed by Fiberglas Canada, Ltd., Toronto

Dow Corning
FIRST IN SILICONES



Fiberglas Insulated Electric Motor



"HIGH-SAFETY-FACTOR" INSULATION CUTS DOWN MOTOR FAILURES

Do you want to reduce time and money losses caused by "burnouts" of motors, generators, transformers and other electrical equipment? Many engineers, production executives and maintenance men do it by insisting on Fiberglas "High-Safety-Factor" Insulation Materials for new equipment and maintenance work.

These insulating materials are made from fibers of glass that are unaffected by moisture, oil and corrosive acids or vapors. They possess high heat resistance and great tensile strength, providing a strong, thin, flexible base for insulating impregnants.

The cost of the extra protection afforded by Fiberglas Insulation is slight—only a fraction of the cost of the original equipment. Invaluable savings in time and machinery more than offset the cost of Fiberglas.

Fiberglas Electrical Insulation Materials are sold nationally by leading distributors and are available in the form of laminates, mica combinations, insulated wire, treated or untreated tying cords, braided sleevings and cloths.

Ask your Fiberglas Distributor for the complete story on the use economies of Fiberglas. Add the "extra" protection of "High-Safety-Factor" Insulation to your electrical equipment.

Here is performance and application data about Fiberglas that may help solve your insulation problem. Write today for the new Fiberglas Electrical Insulation Materials catalog, EL 46-11. Owens-Corning Fiberglas Corporation, Dept. 861, Toledo 1, Ohio. Branches in principal cities.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario.

ASK FOR FIBERGLAS IN YOUR NEW MOTORS—AND ON YOUR NEXT REWINDS

OWENS-CORNING
FIBERGLAS
REG. U.S. PAT. OFF.

OTHER FIBERGLAS PRODUCTS: Thermal Insulations • "Dust-Stop" Air-Filters • Fiberglas Yarns and Cloths • Fiberglas Mats

big news
GOVERNMENT
OWNED
SURPLUS PLANTS

FOR LITTLE BUSINESS!

You know that your Government is offering a wide range of choice plants for sale or lease—on attractive terms.

What you may not know, is the exceptionally favorable position of so-called "small business" in acquiring these properties for its particular needs.

If you are *not* the dominant firm in your field—or are *not* affiliated with the leader—or do *not* employ *more* than 500 persons . . . you may be able to qualify as a "small business" under the law governing disposal of these facilities.

Once you are so qualified, there is immediate possibility for you to obtain the plant you want under *high priority*—a priority given the Reconstruction Finance Corporation to purchase these plants for re-sale to small business. Our field offices will advise you how to obtain this priority certification.

You will find that the Government's surplus plant offerings are highly flexible, for example: (1) Entire plants (both large and small)—(2) Land and buildings only—(3) Land and buildings together with such portions of the contained equipment as may be desired—(4) Specific, separate buildings, where the facility is economically and operationally divisible; and—(5) Lease of a portion of a single building under a multiple-tenancy arrangement.

If you are thinking of *expanding* your production, *modernizing* your facilities, *adding* a new process, *relocating* your business or starting a *new* enterprise—make your needs for plant and equipment known to the War Assets Administration office nearest you—see list below.

Write, phone or call for the PLANT-FINDER, a fully indexed, descriptive catalog of Government-owned plants.

WAR ASSETS ADMINISTRATION

OFFICE OF REAL PROPERTY DISPOSAL

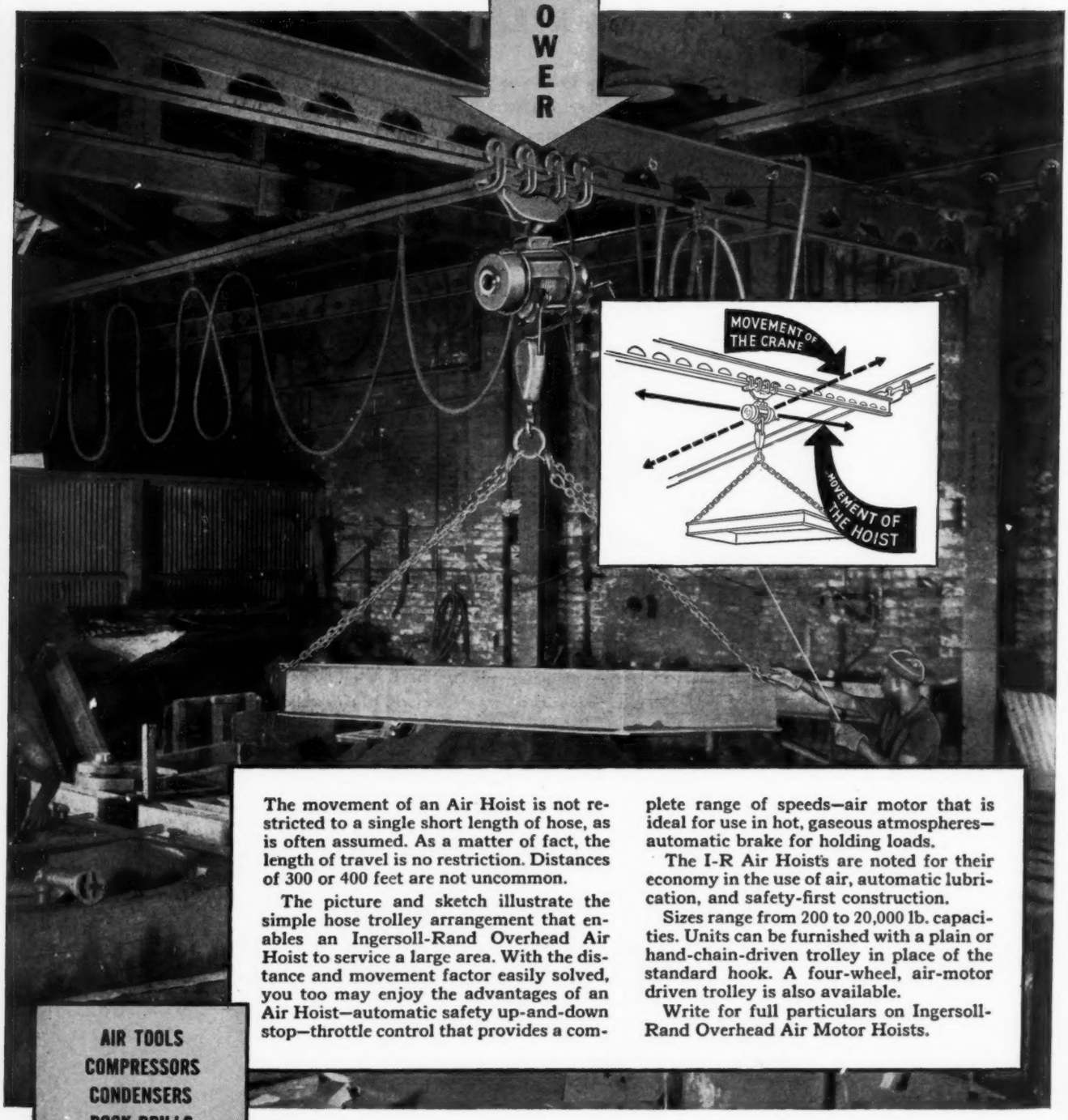
Offices located at: ATLANTA • BIRMINGHAM • BOSTON • CHARLOTTE • CHICAGO • CINCINNATI CLEVELAND • DALLAS • DENVER • DETROIT • FORT DOUGLAS, UTAH • HELENA • HOUSTON JACKSONVILLE • KANSAS CITY, MO. • LITTLE ROCK • LOS ANGELES • LOUISVILLE • MINNEAPOLIS NASHVILLE • NEW ORLEANS • NEW YORK • OMAHA • PHILADELPHIA • PORTLAND, ORE. • RICHMOND ST. LOUIS • SAN ANTONIO • SAN FRANCISCO • SEATTLE • SPOKANE • TULSA

181-3

Don't overlook the MOVE of an Air Hoist..

LIFT

LOWER



The movement of an Air Hoist is not restricted to a single short length of hose, as is often assumed. As a matter of fact, the length of travel is no restriction. Distances of 300 or 400 feet are not uncommon.

The picture and sketch illustrate the simple hose trolley arrangement that enables an Ingersoll-Rand Overhead Air Hoist to service a large area. With the distance and movement factor easily solved, you too may enjoy the advantages of an Air Hoist—automatic safety up-and-down stop—throttle control that provides a complete range of speeds—air motor that is ideal for use in hot, gaseous atmospheres—automatic brake for holding loads.

The I-R Air Hoists are noted for their economy in the use of air, automatic lubrication, and safety-first construction.

Sizes range from 200 to 20,000 lb. capacities. Units can be furnished with a plain or hand-chain-driven trolley in place of the standard hook. A four-wheel, air-motor driven trolley is also available.

Write for full particulars on Ingersoll-Rand Overhead Air Motor Hoists.

AIR TOOLS
COMPRESSORS
CONDENSERS
ROCK DRILLS
TURBO BLOWERS
CENTRIFUGAL PUMPS
OIL & GAS ENGINES

SEVENTY-FIFTH ANNIVERSARY

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 8-928

For Your
REFERENCE FILE

FACTORY offers the following reprints. They treat, concisely and authoritatively, subjects of vital importance under today's conditions of production and employee relations.

PRICE 25 CENTS EACH

(Postpaid)

7. Quality Control
9. Motion Economy
15. Plant Layout
38. How to Rate Jobs and Men
45. Foremanship Fundamentals
46. Planning and Control in Subcontracting
53. From Oil to Coal
59. How to Get the Most Out of Belts
60. How to Get the Most Out of Electric Motors
62. How to Get the Most Out of Lubricants
63. How to Get the Most Out of Wire, Cable, Cord
64. Organization and Control of Mass Production
68. How to Get the Most Out of Mechanical Power Transmission Equipment
70. Set Up a Manpower Control Program (Experience of Armstrong Cork)
78. Provide Adequate Electrical and Mechanical Services (Experience of Buda Mfg.)
79. Look After Employee's Health (Vultee Aircraft)
80. Transmitting Management Information to Supervision
81. Management at the Bargaining Table
82. Standard Times for Maintenance
85. Visual Aids in Employee Training
86. Motion-Time Standards
87. Low-Cost Power for Low-Cost Products
89. Work Simplification for Foremen
90. Standardized Factory Facilities
91. Dramatizing Personnel Policies
92. How to Get the Most Out of Ball and Roller Bearings
93. Planning the Pallet System
94. Job Evaluation by the Point System
95. Work Measurement
96. Air Conditioning—What It Is And What It Does
97. P-Charts For Quality Control
98. Multiple Management
99. Lubrication
100. Production Planning

MAIL THIS COUPON

Editor, FACTORY
330 West 42nd St., New York 18, N. Y.

Please send me .....copies each of the reprints represented by the numbers circled. I enclose check ( ), money orders ( ), for $.....

Name .....

Address .....

City .....

State .....

7, 9, 15, 38, 45, 46, 53, 59, 60, 62, 63, 64, 68, 70, 78, 79, 80, 81, 82, 85, 86, 87, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

SEARCHLIGHT SECTION

POSITIONS VACANT

(Additional Positions Vacant ads on opposite page)

MANAGEMENT CONSULTING firm expanding seeks District Manager to become Resident Firm Member in New England, Phila. or Mid-West. Must have excellent background management or industrial engineering. Able to administer territory, supervise plant assignments and develop business. With sufficient financial responsibility to cover few months preliminary training and development. Substantial participation in profits to right man able and willing to assume genuine responsibilities. Replies held confidential. P-722, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

ENGINEER DESIGNER—College graduate, at least 8 years experience—for Plant Engineering Office of established company in vicinity of Philadelphia. State salary and experience in first letter. P-723, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

WANTED: Industrial Engineer for large tool manufacturing firm. Must have minimum of twelve years' experience in supervising time and motion study, establishing standards data, plant layout, material handling, departmental organization, line-assembly methods, production control. Must be familiar with factory accounting methods. In applying please submit full experience and educational record together with business references. P-748, Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED: By large manufacturing concern, a competent and qualified man to install and supervise administration of wage incentive plan for machine shop, foundry, forge shop, and indirect labor operations. Must have at least eight years' experience. Also must have successfully installed wage incentive program and be able to identify companies of successful installation. In applying, please give experience and educational record together with business references. P-749, Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED: Assistant Factory Manager—Capable young executive with experience in making precision parts and a comprehensive knowledge of modern factory administration in all its phases, including labor relations and time study and wage incentive rates. Must be man of high integrity, who can organize and lead and inspire confidence and respect. Must be energetic and cost-minded, have engineering background and past record in manufacturing as a quantity and quality producer. Give details of background for position with nationally known manufacturer of high-grade product, seeking services of a vigorous and thoroughly competent Assistant Factory Executive and offering a permanent connection with real future. P-750, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL ENGINEERS—Large manufacturing company in the middle west has openings on its wage practices staff (job evaluation, motion and time study and wage investigation) for a limited number of industrial engineers. Industrial, Mechanical, or Electrical Engineering graduates with experience in the industrial engineering field preferred. In reply give complete details including age, education, and experience and enclose a recent photograph (not to be returned). P-751, Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

ADMINISTRATIVE and Supervisory position in connection with the manufacture of organic chemicals. Minimum 5 years experience. B.S. or Ph. D. required. Write, giving full information regarding education and past experience. P-747, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

EMPLOYMENT SERVICE

EXECUTIVE, TECHNICAL, Sales, Office—Qualifications of selected applicants submitted without charge or obligation. Licensed and bonded. National Employment Service, 200 Time Bldg., Minneapolis 3, Minn.

POSITIONS WANTED

COMMON SENSE seasoned by 17 years work in administration, liasion, purchasing, supervision, production, timestudy, form design, and precision inspection with nationally known manufacturers. Good knowledge of machinery, process, materials and tools. Interested in a permanent connection with a reliable progressive firm. Now employed. PW-702, Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.

EXECUTIVE POSITION wanted by Soap Expert in Mfg. Eng. Lab. & Sales. Installed 4 Plants and sold 11 Patents. Can invest. Dr. E. H. Bronner, 6508 S. Kimbark Ave., Chicago, Ill.

TROUBLE WITH Soap? Expert will help you. Any kind soap. Men trained. Hi-speed Lab. & kettle technique. DEWEES, 1316 E. 61, Chicago, Hyde Park 0865.

GENERAL MANAGER: With ability, experience, tact and initiative. Mechanical engineering and administrative training. Wide and practical experience and demonstrated ability in small and large volume manufacturing. Capacity to direct and get things done profitably. Can build up an organization and get the most out of it. Presently employed as General Manager in full charge. PW-726, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL ENGINEER—15 years experience Methods, Design, Work Simplification, Statistical analysis. Incentives, Quality and Cost Control Systems, desires position heading up a cost reduction program. PW-730, Factory Management & Maintenance, 68 Post Street, San Francisco 4, Calif.

PERSONNEL-LABOR Relations Manager—12 Years Experience. Nationally known corporations. All phases personnel administration. Contract and wage negotiations, grievances, safety, cost and quality controls, some production. Organized 2 personnel departments. Prefer New England. Would like combination personnel and assistant production manager. American, age 40, married, 2 children, college, Christian. Salary $5,000 to $7,500. PW-735, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL ENGINEER: Eight years diversified Industrial Engineering experience, including developments, layouts, methods, costs, time and motion study. Age 40. M.E. degree. PW-753, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

EXECUTIVE: WORKS or Plant Manager, Consulting Management engineer desires position in progressive manufacturing enterprise. Experience in plant layout, job evaluation and wage administration, methods engineering, time study and wage incentives, production planning, and control, product cost and profit structure analysis, and supervisory instruction in wide variety of industries. PW-665, Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.

PLANNING MANAGER: Nine years progressive experience mass production industry. Specialty is formulating and executing Production Programs to meet Sales demands. Good organizer and coordinator. Sound knowledge of Material and Inventory Control, Scheduling, Routing, Dispatching, Shipping, Stores, and other Planning functions. PW-752, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL ENGINEER or Assistant to management: University graduate; high scholastic record; four years experience in production, employee relations, wage incentives, job evaluation, methods, time study and costs; two years naval officer; aggressive, ambitious, get along well with people in getting things done. California. PW-754, Factory Management & Maintenance, 68 Post Street, San Francisco 4, Calif.

PLANT MANAGER'S assistant well balanced background in the metal working industries. Experienced in administration, budgeting, internalcontrols, liasion, supervision, purchasing, correspondences, production and sales. Prefer Middlewest or Northwest. Age 38. PW-755, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

INDUSTRIAL ENGINEER B.S. MBA. Exp. Production and Manufacturing Methods of Metal Trades. Capable of analysis and solution of managerial and organizational problems. Ex Naval Supply Officer. No preference as to location; will travel here or abroad. PW-756, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

PLANT ENGINEER, Graduate M.E., presently employed, age 42, 18 years excellent eng. experience includes mach. design and development, mach. maintenance, management of labor and harmonious handling of management policies and union contracts. Desire location in South or Southwest. PW-757, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

TIME STUDY Engineer desires permanent position with small or medium sized manufacturing concern. Experienced in radio manufacturing, sheet metal fabrications and assembly, development and use of standards, methods improvement, job evaluation and setting up of progressive line assembly. Am at present head of methods and timestudy department in small factory. Best of references furnished. PW-758, Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.

CHIEF INDUSTRIAL Engineer experienced in all phases of Industrial Engineering including Job Evaluation, Time and Motion Study, Wage Incentives, Cost and Production Control, budgets, organization and executive reports. Has had full responsibility for building and training personnel of an Industrial Engineering Department of 25 men in a plant employing 5500. Seeks connection as Chief Industrial Engineer or Assistant to a production executive with large or medium sized aggressive company. Location immaterial. Graduate Engineer post-graduate work in Industrial Engineering. Age 28. Presently employed. Minimum salary $8000. PW-759, Factory Management & Maintenance, 330 W. 42nd Street, New York 18, N. Y.

UNIVERSITY OF Illinois "Commerce" Graduate seeks position with medium or large size manufacturing company. Prefers production control or cost department. Two summers industrial work plus courses in accounting and industrial management have prepared me for this work. Available after February 10. Send detailed letter and references. Address Herbert Brandwein, 560 Cornell Avenue, Chicago 15, Ill.

CHIEF INDUSTRIAL Engineer: Desires similar connection with well-established company. Age 39, graduate engineer, 15 years broad industrial engineering experience in process type industries, including wage administration, job evaluation, scheduling, methods improvement and costs. Well versed in organization analysis and salary administration. Prefer location around Philadelphia or New York. Minimum salary $9000. Complete resume on request. PW-760, Factory Management & Maintenance, 330 W. 42nd Street, New York 18, N. Y.

SELLING OPPORTUNITY WANTED

EXPERIENCE SALES Engineer of Pittsburgh, Pennsylvania, interested in lines to sell to Utilities, Industrial Companies and Mining Companies. Good connections and references. SA-761, Factory Management & Maintenance, 330 W. 42nd St., New York 18, N. Y.

WANTED

MECHANICAL ENGINEER

Established pharmaceutical concern offers fine opportunity in its Design Engineering Department. Responsibilities include preparation of plans and specifications for all alterations and additions involving mechanical equipment (includes material handling, packaging, piping, wiring, special machinery, jigs, fixtures, power plant equipment, and air conditioning). Philadelphia area. B. S. Degree and several years' experience in design and development work required. Please state fully, age, education, and work experience. Replies to

P-746, Factory Management & Maint.,
330 West 42nd St., New York 18, N. Y.

AVAILABLE!

WORKS MANAGER
MANUFACTURING EXECUTIVE

with thorough management and manufacturing background in the production of automotive, rail, air, and associated equipment. Graduate engineer with 22 years of successful production and management experience. Labor and production record excellent in directing all phases of operation involving in excess of 15,000 employees.

PW-744, Factory Management & Maint.
68 Post St., San Francisco 4, Calif.

AVAILABLE

EXECUTIVE ASSISTANT

Twelve years experience in Management. Thoroughly competent woman. New York area preferred. Salary open.

PW-763, Factory Management & Maint.,
330 West 42nd St., New York 18, N. Y.

REPRESENTATIVES WANTED

For well proved money saving product needed by metal fabricators, railroads, aircraft, automotive, machine shops, etc. Can be sold best by salesmen already contacting these fields. We ship on your order and handle details of accounting. Commission 25%. Territorial protection. In your letter specify territory you cover, firms or lines you represent. Product in production and available for immediate shipment. Write today to:

Vanguard Advertising, 15 E. 40, New York 16, N. Y.

WANTED

PLANT SUPERINTENDENT

A large Ohio metal working manufacturer desires a Plant Superintendent for a plant employing 800 men in general machine and assembly work.

Address

P-739 Factory Management & Maint.
520 North Michigan Ave., Chicago 11, Ill.

PLANT ENGINEER

Engineer with over twenty years experience in plant construction & maintenance and power plant operation desires position in Atlantic Coast or Southern States.

Full particulars & references on request.

PW-691, Factory Management & Maintenance
330 West 42 St., New York 18, N. Y.

SALES EXECUTIVE

Young aggressive sales executive, thoroughly acquainted with automotive industry, now forming sales organization capable of giving full sales and service coverage on machine tool accessories and production tool equipment, desires exclusive sales rights for states of Michigan and Ohio.

RA-731, Factory Management & Maintenance
520 North Michigan Ave., Chicago 11, Ill.

AVAILABLE

INDUSTRIAL ENGINEER

Time Study-Routing-Standards-Layout
28 years experience
Temporary position to set up incentive system, new methods or plant layout would be acceptable.

PW-764, Factory Management & Maintenance,
330 West 42nd St., New York 18, N. Y.

EASTERN MANUFACTURERS

Established California Technical Engineering Sales Representative in position to assume responsibility of all West Coast Sales Activity. Sales Manager coupled with wealth of industrial experience. Excellent Clientele. A-1 References. P. E. & S. Co. Room 608, W. M. Garland Bldg., 117 West 9th St., Los Angeles 15.

Additional Employment Advertising on Opposite Page

SEARCHLIGHT SECTION

WANTED

PROJECT ENGINEER

Excellent opportunity for structural engineer. B. S. Degrees in civil engineering and at least three years in construction business or consulting engineer's office required. Duties to include: 1. Preparation and designing of plans and specifications for additions, alterations, major maintenance of all buildings, partitions, structures, and installations of process equipment. 2. Supervising the installation of structural steel, iron, and timber. 3. Contracting suppliers. 4. Inspecting buildings. Philadelphia area. State fully age, education, and work experience. Replies to

P-745, Factory Management & Maint.
330 West 42nd St., New York 18, N. Y.

WANTED

Heavy industry fabricating plant in the South desires a mature man of experience having qualifications in Plant layout, Designing of special machine tools, jigs, fabricating fixtures and hot and cold forming dies.

Good opportunity for the right man.

P-738, Factory Management & Maint.
520 North Michigan Ave., Chicago 11, Ill.

WANTED

WORKS MANAGER

Well established, old line Ohio Company employing 1500 persons needs a Works Manager. Complete responsibility for all manufacturing operations. Machine work and sheet metal production experience desirable. This is an unusual opportunity. Address

P-740 Factory Management & Maint.
520 North Michigan Ave., Chicago 11, Ill.

WANTED

DESIGN ENGINEER

Large prosperous company seeks Mechanical Engineer with experience in design of small, metal, or metal and plastic, consumer articles with demonstrated success in research and product development. Salary $12,000. Location New York. Our employees know of this advertisement.

P-743, Factory Management & Maintenance,
330 West 42nd St., New York 18, N. Y.

WANTED—CHIEF ENGINEER

Old well-established company manufacturing consumer articles of sheet metal in mass production is seeking Chief Engineer with engineering degree from good college, preferably Master's Degree. Familiarity with electrical engineering necessary. Experience in research and production development. Salary $16,000 to $20,000.

P-741, Factory Management & Maintenance,
330 West 42nd St., New York 18, N. Y.

WANTED

GENERAL WORKS MANAGER

Old company engaged in manufacturing consumer articles of sheet metal in mass production seeks man with successful record as manufacturing executive and in handling labor. Experience with vitreous enamelling desirable. Under fifty. College graduate. Salary $18,000 to $20,000.

P-742, Factory Management & Maintenance,
330 West 42nd St., New York 18, N. Y.

Simplify Your Machine Tool Problems With Botwinik's All-Purpose Service

For efficient, low cost production, take advantage of Botwinik's all-purpose service in new, used and rebuilt machine tools.

1—Monarch 22" x 22', Mod. M, 16 speed, Helical Grd. Eng. Lathe, M.D., with risers, sw. 30½", cens. 168", AC elect. equip. Brand new.
1—Bridgeford 36" x 56', 15 speed, grd. hed. Eng. Lathe, M.D., AC elect. equip., power rap. trav. to carr., compound rest, 2 steady rests, sw. 38" over bed, 26" over carr., dist. betw. cens. 48'.
1—Whit.-Blais. 20" x 24', QCG, dbl. bk. grd. Eng. Lathe, M.D.
1—Hendey 16" x 8', Mod. EBM, Eng. Lathe, 18 speed, taper attmt.
L. & S. 16" x 6', 20" x 8', 12 speed, select. grd. hed., Eng. Lathes, M.D.
1—B. & S. No. 3A Univ. Miller, dbl. overarm, motor in base, tbl. wkg. surf 55½" x 14", power feed long, 34", cross 12", vert. 19".
1—Van Norman No. 3 Duplex Miller, with high speed mill. attmt., 12 speeds, tbl. wkg. surf. 48¼"x10", power feed long. 32", cr. 12", v. 18⅞".
1—Cin. No. 3 Hi Power Pl. Miller, tbl. wkg. surf. 55¾" x 10½", power feed long. 34", cross 10", vert. 20".
Bullard 24", 36" and 42" New Era Type Vert. Bor. & Turn. Mills, M.D., cap. and diams. 26", 38", 44", hghts. under cr. rail 20", 24", 33", side heads.
Bullard 36" (2), 54" "Spiral Drive" Vert. Bor. Mills, high speed, very lat. type.
1—14' Sellars V. Bor. Mill, 2 heds. on cross rail, elect. equip.
1—King. 72" Vert. Bor. Mill, M.D., 53" under cr. rail, 2 heds. under cr. rail.
3—Cin. No. 2 Centerless Grinders, very lat. type, Filmatic bearings, cap. bar wk. ⅛" to 2" diam., 18' long, cap. short wk. 1/16" to 3½" diam.
1—Blanchard No. 16 Roty. Surf. Grinder, M.D., 30" diam. x 12" under new wheel.
3—W. & S. No. 4 Univ. Turret Lathes, v. lat. type with pre-sel. hed., hole thru spin. 2 7/16".
3—W. & S. No. 3 Univ. Turret Lathes, lat. type, hole thru spin. 1 27/32".
2—Stand. Mach. Co. No. 4A Swag. Machines, M.D., cap 2⅛", draw. tube 1½", dism. solid, elect. equip., net wght. 2950 lbs. lat. type, 1942 machines, motor in base.

1—Worthington Compressor, 800 cub. ft., 2 stage, 17" x 10½" x 12", wkg. pressure 100 lbs., Laidlaw type valves, 150 HP, AC 220, comp. equip.

BOTWINIK BROTHERS OF MASS., INC.
12 SHERMAN STREET WORCESTER 1, MASS.

SALARIED POSITIONS $2,500—$25,000

This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
276 DUN BLDG. Buffalo 2, N. Y.

EXECUTIVES AND TECHNICAL MEN

Desiring Positions with Stability

We solicit inquiries from qualified candidates who desire to contact employers for positions paying to $25,000 per year. Confidential. Est. 31 years.
(Inquiries from Employers entail no obligation)

THE NATIONAL BUSINESS BOURSE
20 W. Jackson Blvd., Chicago 4

Salaried Positions $3,600 Up

Our service is open for men who have initiative and ability with a good background, in all fields of Industry. No fee or registration charge is made until placed. State fully your qualifications.

GLOBE EMPLOYMENT SERVICE
42 South 15th St Phila. 2, Pa.

WESSELL & BROWN
"EMPLOYMENT SPECIALISTS"
1414 S. PENN SQUARE—PHILA. 2, PENNA.

Philadelphia's most modern and up to date personnel service, specializing in executive and technical personnel. We have available, factory managers, production managers, superintendents, Plant engineers, industrial and method engineers, comptrollers, office managers and accountants. We only request that we be given full details pertaining to your requirements, compensation, etc.

YOUR PROFITS DEPEND UPON YOUR EMPLOYEES

Our careful screening and psychological testing assure you of obtaining the most suitable and efficient employees—at no cost.

PERSONALIZED EMPLOYMENT SERVICE
1411 Walnut St., Phila, Pa. LO-7-7711

M·E·C PERSONNEL APPRAISAL

A scientific method of time-proved effectiveness in evaluating aptitude, skill and temperament of persons for employment or promotion, related to your specific jobs. (Write for detailed information.)

One of the specialized services to Management of

METHODS ENGINEERING COUNCIL
H. B. Maynard, *President*
822 WOOD ST. PITTSBURGH 21, PA.

WANTED
AUTOMATIC OR SEMI-AUTOMATIC PACKAGING LINE

To bottom seal, line with wax paper, fill, top seal, and tight wrap 1¼# and 2½# packages. Will consider one line for each package, or single adjustable line. Please contact us if you have all or any part of this equipment.

CHELSEA MILLING COMPANY
Chelsea, Michigan

WANTED

AIR COMPRESSORS

Stationary — 100 Cfm and Up
Portable — 2 Stage Only

L. W. BAUER
North Bergen, N. J.

SEARCHLIGHT SECTION

AIR-CONDITIONING UNIT

30 ton Carrier Air Conditioning Unit, complete with Kathabar unit. Used four months.

SIX AIR COMPRESSORS

2—Schramm gas driven air compressor. Displacement 315 CFM and 210 CFM, at a working pressure of 100#. Portable mounted on pneumatic tires with a spare set of steel wheels, complete and self-contained.

ELECTRIC WELDERS

300 and 400 amp. Electric Motor Driven Welders. General Electric, Hobart, Lincoln. New 1943, used less than one year—Reconditioned.

HOISTS

½, ¾, 1, 1½ and 2 ton Chain Hoists, standard lift. ½, 1 and 1½ ton Electric Hoist, 3 ph. 60 cyc. 220/440 V.

GASOLINE DRIVEN POWER PLANT

1—Gasoline driven power plant, 28 KW or 35 KVA. Hercules Motor Corp. engine, 4¼x4¾, Model WXLC-3, Serial #180572, with U. S. Motors Generator, Type M-7, 220 volt, 3 phase, 60 cycle, 1200 RPM, Serial #2981, complete self-contained with panelboard. Has a center tap, 110 volts, single phase.

TRANSFORMERS

6—1000 KVA General Electric transformers, 60 cycle, single phase, type H form VDM, 40°, 11,500 primary to 2300/4000Y/460 secondary subtractive polarity with 4—2½% taps 40°.

3—100 KVA Kuhlman transformers, single phase, 60 cycle, type OISC, 55°, 11,500 volt primary to 2300 volt secondary subtract polarity with 4—2½% taps.

10—7½ KVA transformers single phase, 60 cycle, 2300 volt primary 115/230 volt secondary.

5—15 KVA transformers, single phase, 60 cycle, 2300 volt primary 115/230 volt secondary.

6—25 KVA transformers, single phase, 60 cycle, 2300 volt primary 115/230 volt secondary.

14—50 KVA transformers, single phase, 60 cycle, 2300 volt primary 115/230 volt secondary

3—75 KVA transformers, single phase, 60 cycle, 2300 volt primary, 115/230 volt secondary.

HEAT and POWER Co., Inc.

70 PINE ST. NEW YORK 5, N. Y.

Whitehall 3-2172

OVERHEAD CRANES

1-Ton:
Whiting 33' Span
Curtis 24' Span
1½-Ton:
Shepard Niles 25'6" Span
P&H 34' Span
2-Ton:
Louden 19'2" Span
Box 36'9" Span
Detroit 28" Span
3-Ton:
Shaw 33' Span
P&H 25' Span
Northern 22' Span
Manning, Maxwell & Moore 48'¾"
"Conco" 48' and 26'6" Spans
5-Ton:
Whiting 47'4" Span
38'10½" Span D.C.
Northern 30'9" Span
Milwaukee 70' Span
Milwaukee 66'9" Span
Manning, Maxwell & Moore 70' Span
Manning, Maxwell & Moore 47'4" Span
Shaw 36' Span
Champion 37'6" Span
American 70' Span
American 47'4" Span
6-Ton:
P&H 77' Span
American 77' Span
7½-Ton:
Shepard 36' Span
10-Ton:
Shaw 68' Span
Shaw 73' Span
P&H 30' Span
P&H 87'6" Span
P&H 80' Span
Northern 71'10½" Span
Northern 60' Span
Morgan 55'6" Span
Morgan 39'5" Span
Morgan 52'3" Span
Milwaukee 66'9" Span
McGill 85' Span
Lane 50' Span
Emsco 75' Span
Dominion 35' Span
Cleveland 38½" Span
Cleveland 50' Span
Alliance 71'10½" Span
Alliance 58'9" Span
Albany 60' Span
15-Ton:
Whiting 71' 10½" Span
Northern 53' Span
Erie 60' Span
Chesapeake 55'6" Span
Case 51' Span
20-Ton:
Shepard Niles 49'6" Span
P&H 51'4" Span
Northern 60' Span
Morgan 60' Span
Cleveland 65' Span
25-Ton:
Whiting 106' Span
Tysaman 60' Span
P&H 70' Span
Morgan 52'3" Span
Cleveland 106' Span
Case 63' Span
Bedford 50' Span
30-Ton:
Whiting 80' Span
P&H 80' Span
P&H 60' Span
Morgan 30' Span
Case 41' Span
35-Ton:
Bedford 50' Span
Northern 22' Span
50-Ton:
Shaw 95' Span
Shaw 69'10" Span
Dominion 80' Span
Cleveland 71'10½" Span
75-Ton:
Morgan 59'2½" Span
Alliance 78' Span
Alliance 37' Span
80-Ton American 40'6" Span
125-Ton Morgan 100' Span
150-Ton Whiting 30' Span
175-Ton Morgan 54' Span
200-Ton Alliance 100' Span

Telephone us collect to discuss your requirements.

ECONOMY CO., INC.

49 Vanderbilt Avenue, New York 17, N. Y.

Tel.: MUrrayhill 4-2294, 4-2893, 4-2295, 4-2844, 4-2296, 4-8292

—TRANSFORMERS—

TRANSFORMERS WANTED

in operating condition or burnt out. Mail us list giving complete nameplate data and stating condition.

We Rewind, Repair and Redesign all Makes and Sizes

ALL TRANSFORMERS GUARANTEED FOR ONE YEAR

THE ELECTRIC SERVICE CO., INC.

"AMERICA'S USED TRANSFORMER CLEARING HOUSE"

STATION M Since 1912 CINCINNATI, OHIO

DETROIT ELECTRIC FURNACE

Type LF, 350 to 500 lbs. capacity brass or equal; has practically new basic lining, box of electrodes, complete electrical equipment, including 440 volt, single phase, primary transformer, oil switch, instruments, bus copper and cables. Excellent condition. Ready to run.

Price $225.00

Prints and Photos on request

KRANE KAR

Mfg. by Silent Chain & Hoist Co., Brooklyn, New York, Industrial swinging type boom lift truck. Adjustable type boom from 4 ft. to 18 ft. 10,000# capacity mounted on 11.00 x 24" pneumatic tires, powered by 4 cyl. Buda gas. engine, has all weather removable enclosed cab, used less than 3 months. Ideal for handling machinery and loading and handling all kinds of materials.

Dimension sheets and price on request.

ALL FOR IMMEDIATE DELIVERY AND SUBJECT TO PRIOR SALE.

STEWART BOLLING & COMPANY, INC.

3190 East 65th Street, Cleveland, Ohio

VALVES

INDUSTRIAL & MARINE

METROPOLITAN

PLUMBING SUPPLY CO. INC.

Power Plant Valves and Engineering Specialties for Oil, Steam, Gas, Air, Liquids and Chemicals.
Jenkins, Fairbanks, Sarco, Powell Valves and surplus.
Large Complete Stocks ½" to 24"
313 East 31st St., N. Y. C.
For Hourly Nation-Wide Shipments
CALL Murray Hill 3-3408

CRETON PIPE & FITTINGS

COMPRESSORS
Vacuum Pumps

New & Guaranteed Rebuilt

Stationaries for Permanent Installation

PORTABLES
SALE OR RENTAL

For Standby Service or Demolition Work

Worthington Exclusive

North Jersey Distributors

AMERICAN AIR COMPRESSOR CORP.

4800 Dell Ave. N. Bergen, N. J.

N.Y. Phone, Ch. 4-7665. N.J. Phone, Union 5-4848

INDUSTRIAL RADIO FREQUENCY GENERATOR

Nearly New—Westinghouse 20 KW-450 Kilocycles. Bought New May 45 used 168 Hrs.—Less than 1 percent life expectancy. $6,900. Includes a few electrodes.

VARD INC.

2961 E. Colorado, Pasadena 8, Calif.

ELECTRICAL MACHINERY

Motors and generators. A.C. and D.C. for sale at Attractive Prices. Large Stock New and Rebuilt. All Guaranteed. Send us your inquiries.

V. M. NUSSBAUM & CO.

FORT WAYNE 2, IND.

FORK LIFT PALLETS

For sale—2500-30" x 42" all hard wood pallets almost new subject to inspection and immediate delivery. Price reasonable.

Atlantic Varnish and Paint Co.

Richmond, Va.

Company Community Country

YOU HELP ALL 3 WITH THE P. S. P.

● Participants in the Payroll Savings Plan benefit directly in terms of cash—because U. S. Savings Bonds at maturity pay $4 for every $3 invested.

Your company, your community, and your country benefit indirectly in terms of security—because: (1) Employees with a solid stake in the future are likely to be stable, productive workers. (2) The Bond-buying habit of local citizen-employees means a reserve of future purchasing power—a safeguard for the stability of your community. (3) Every Bond bought temporarily absorbs surplus funds and helps check inflationary tendencies.

You're doing everybody a favor—including yourself—by supporting the Payroll Savings Plan.

ARE YOU USING THESE BOOKLETS?

If not, or if you wish additional copies, just ask your State Director of the Treasury Department Savings Bonds Division.

The Peacetime Payroll Savings Plan—A booklet, published for key executives by the Treasury Department, containing helpful suggestions on the conduct of your payroll savings plan for U. S. Savings Bonds.

This Time It's For You—A booklet for employees ... explaining graphically how the payroll savings plan works ... goals to save for, and how to reach them with Savings Bonds.

The Treasury Department acknowledges with appreciation the publication of this message by

FACTORY MANAGEMENT & MAINTENANCE

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council

Index To Advertisements

Abrasive Products, Inc. 250
Acme Steel Company 180
Adam Electric Company, Frank 281
Airetool Manufacturing Co. 282
Air Express Div., Railway Express 210
Ajax Flexible Coupling Co. 248
Alemite Div., Stewart-Warner Corp. 167
Allegheny Ludlum Steel Corp. 335
Allen-Bradley Company ..... insert 208, 209
Allen Mfg. Co. 236
Allied Products Corporation 183
Allis-Chalmers Mfg. Co. 10, 77, 269, 377
Aluminum Co. of America 243, 251
Aluminum Industries, Inc. 73
Alvey Conveyor Co. 262
Alvey-Ferguson Co. 208
American Air Filter Co. 182
American Felt Co. 340
American Gas Association 78
American Hoist & Derrick Co. 52
American Institute of Bolt, Nut, & Rivet Mfrs. 54, 55
American Lumber & Treating Co. 218
American Machine & Metals, Inc., United States Gauge 270
American Monorail Co. 47
American Mutual Liability Insurance Co. 75
American Optical Company 348
American Screw Co. 261, 213
Ames Co., B. C. 274
Anaconda Wire & Cable Company 260
Appleton Electric Co. 190
Archer Rubber Co. 384
Arkansas Fuel Oil Co. 309
Armstrong-Bray Co. 374
Armstrong Machine Works 362
Aro Equipment Corp. 253
Arrow-Hart & Hegeman Electric Co. 86
Atkins & Co., E. C. 74
Atlantic Screw Works 213
Atlas Bolt & Screw Co. 213
Automatic Sprinkler Corporation of America 198
Automatic Transportation Co. 87

Baker-Raulang Co. 7
Baldwin-Hill Co. 354
Bausch & Lomb Optical Co. 255
Bird & Son, Inc. 292
Black Manufacturing Co. 187
Blackhawk Mfg. Co. 275
Blanchard Machine Company 207
Bond Foundry & Machine Co. 280
Bostitch, Inc. 359
Boston Woven Hose & Rubber Co. 307
Bryant Chucking Grinder Co. 185
Buffalo Wire Works Co., Inc. 282
Bullard Company 181
Bulldog Electric Products Co. 298
Bunnell Machine & Tool Company 387
Bunting Brass & Bronze Company 291

Carboloy Co., Inc 21
Carborundum Company 247
Carnegie-Illinois Steel Corp. 30, 31
Carrier Corp. 201
Celanese Corp. 231
Central Screw Company 213
Century Electric Company 302
Chain Belt Co. 26
Chandler Products Corp. 213
Chase Brass & Copper Co. 338
Chicago Pneumatic Tool Company 341
Chicago Rawhide Mfg. Co. 196
Cincinnati Milling Machine Company 205
Cities Service Oil Co. 309
Clarage Fan Company 375
Clark Controller Co. 241
Cleveland Crane & Engineering Co. 197
Cleveland Twist Drill Co. 279
Cleveland Wire Spring Co. 327
Coffing Hoist Co. 364
Colson Corporation 221
Columbus-McKinnon Chain Corporation 186
Cone Automatic Machine Co., Inc. 289
Continental Car-Na-Var Corp. 272
Coppus Engineering Corp. 71
Corbin Screw Div. of American Hdwe. Corp. 213
C-O Two Fire Equipment Co. 194
Crane Co. 80
Crescent Truck Company 318
Cuno Engineering Corporation 32, 33
Curtis Pneumatic Machinery Co. 268
Cyclone Fence Co. 326

Dallet & Company 240
Darnell Corp., Ltd. 252
Dayton Rubber Mfg. Co 232, 233
De Laval Separator Co. 319
De Laval Steam Turbine Co. 223, 278
Delta Manufacturing Co. 61
Denison Engineering Company 35
Despatch Oven Company 363
De Vilbiss Company 331
Dick Company, A. B. 37
Dixie Cup Co. 67
Dolge Company, C. B. 364
Dow Corning Corporation 354, 376, 388
Doyle Vacuum Cleaner Co. 270
Dracco Corporation 258
Dravo Corporation 29
Duff-Norton Manufacturing Co. 202
Dumore Company 59
Du Pont de Nemours & Co., E. I. ..... insert 48
Dura-Tred Company 372

Eastman Kodak Company 259
Ebco Manufacturing Co. 276
Electric Controller Mfg. Co. 286
Electric Storage Battery Company 161
Employers Mutual Liability Insurance Company of Wisconsin 228, 229

Factory Management & Maintenance 393
Factory Service Co. 176
Fairbanks Co. 364
Federal Electric Co., Inc. 60
Federal Electric Co., Inc., Plastics Div. 301
Federal Electric Products Co. 267
Federal Machine & Welder Co. 42, 43
Feedrail Corporation 15
Finnell Systems, Inc. 245
Flexible Steel Lacing Co. 172
Flintkote Co. 79
Foote Bros. Gear & Machine Corporation 347
Fostoria Pressed Steel Corp. 48
Foxboro Co. 219
Frasse & Co., Peter A. 296

Gardner-Denver Co. 177
General Box Company 62
General Electric Co. 339, 365
General Electric Co., Air Conditioning & Commercial Refrigeration Division 284
General Electric Co. (Lamp Dept.) 344
General Electric Co. (Merchandise Dept.) 69, 323
General Electric Co. (Plastics Dept.) 211
Gifford-Wood Co. 58
Goergen-Mackwirth Company, Inc. 388
Goodrich Company, B. F. 1
Graybar Electric Co. 5
Grinnell Co. 285
Gulf Oil Co. 305

Hansen Manufacturing Co. 49
Harnischfeger Corporation 317
Harper Company, H. M. 246
Haskelite Manufacturing Corporation 283
Haynes Products Co. 370
Hein-Werner Motor Parts Corp. 378
Hertner Electric Co. 196
Hillyard Chemical Company 358
Hinde & Dauch Paper Company 4
Hobart Brothers Co. 352
Hodgman Rubber Co. 276
Hoffman Specialty Co. 178
Hollingshead Corporation, R. M. 369
Holliston Mills, Inc. 314
Howard Engineering & Manufacturing Co. 382
Howell Electric Motors Co. 57
Howland, W. H. 346
Hughes-Keenan Company 206
Hunt & Son., Inc., C. B. 76
Hyatt Bearings Co., Division General Motors Corporation 163
Hyster Company 227

Imperial Brass Mfg. Co. 343
Independent Pneumatic Tool Co. 39, 217
Industrial Control Div., Square-D ..... Third Cover
Industrial Tools & Products 272
Ingersoll-Rand Co. 392
Inland Steel Co. 384
International Business Machines Co. 263
International Screw Co. 213
Invincible Vacuum Cleaner Co. 299

Jeffrey Manufacturing Co. 20
Jenkins Bros. 203
Johns-Manville Co. 28, 193, 222, 304, 355, 400
Johnson Steel & Wire Co. 358
Jones & Lamson Machine Company 6
Jones & Laughlin Steel Corp. 165, 171
Jones Foundry & Machine Co., W. A. 370

Kansas Industrial Development Commission 256
Kearney & Trecker Corporation 22, 23
Keasbey & Mattison Co. 38
Keller Tool Co. 237
Kester Solder Co. 340, 370
Kex National Service 254
Kidde & Company, Inc., Walter 381
Koppers Company, Inc. 361

Ladish Drop Forge Co. ..... insert 256
Laminated Shim Company, Inc. 332
Lamson & Sessions Co., The 63, 213
Lelong, Inc., Lucien 11
Levinson Steel Company, The 287
Lewis-Shepherd Products, Inc. 311
Lift Trucks, Inc. 257
Lightfoot Schultz Company 244
Lincoln Electric Co. 40, 41
Lincoln Engineering Co. 315
Link-Belt Company 9, 13
Lisbon Hoist and Crane Co. 352
Logan Engineering Co. 321
Lunkenheimer Co. 209
Lux Fire Extinguishers 381
Lyon Metal Products, Incorporated 24, 25

Mahon Company, R. C. 264
Manhattan Rubber Mfg. Div. Raybestos-Manhattan Co. 27
Manufacturers Screw Products 213
Master Electric Company 173, 316
Mathews Conveyer Company 174
McCaskey Register Co. 342
McGraw-Hill Book Company 358, 364
Mercer-Robinson & Co., Inc. 346
Milford Rivet & Machine Co. 290
Miller Company ..... insert 49
Miller Co., Gordon B. 306
Mine Safety Appliance Company 212
Minneapolis-Honeywell Co. 277
Minnesota Mining & Manufacturing Co. 225
Missouri State Department of Resources and Development 380
Modine Mfg. Co. 350
Monitor Controller Co. 308
Morse Chain Company ..... Fourth Cover

National Acme Company 50
National Electric Products Co. ..... Second Cover
National Lock Co. 213
National Pallet Corp. 294
National Sawdust Co., Inc. 378
National Screw & Mfg. Co., The 213
New Britain Machine Co. 169

New England Screw Company 213
New Haven Railroad 310
Northwest Engineering Company 17
Nutting Truck & Caster Co. 312

Oakite Products Co. 192
Ohio Electric Manufacturing Co. 368
Ohio Seamless Tube Co. 179
Oliver Iron & Steel Corporation 216
O'Neil-Irwin Manufacturing Co. 278
Optimus Equipment Co. 376
Orangeville Mfg. Co. 370
Orton Crane & Shovel Co. 385
Osborn Manufacturing Company 12
Otis Elevator Co. 242
Owatonna Tool Co. 214
Owens-Corning Fiberglas Corporation 389
Owens-Illinois Glass Company 199

Pangborn Corporation 230
Parker-Kalon Corp. 213
Pawtucket Screw Co. 213
Pheoll Manufacturing Co. 213
Phillips Screw Manufacturers 213
Pick Co., Inc., Albert 234
Pittsburgh Corning Corporation 51
Pittsburgh Plate Glass Co. 303
Pittsburgh Plate Glass Co. (Brush Div.) 371
Portable Products Corporation 374
Powell Company, Wm. 84
Powers Regulator Co. 370
Protected Steel Products 82

Rack Engineering Company 191
Radio Corporation of America 188, 367
Rapids-Standard Co. 238
Rathborne, Hair & Ridgway Co. 313
Reading Chain & Block Corp. 288
Reading Screw Co. 213
Ready-Power Co. 372
Redington Co., F. B. 294
Reliance Electric & Engineering Company 189
Revolvator Co. 352
Reynolds Metals Co. 271
Reznor Manufacturing Company 320
Robbins & Meyers, Inc. 337
Rockbestos Products Corporation 345
Rock-Tred Corp. 370
Roebling Sons Co., John A. 85
Roots-Connersville Blower Corp. 184
Ross Carrier Co. 322
Ruger Equipment Co. 220
Russell, Burdsall and Ward Bolt & Nut Co. 44, 45, 213
Ryerson & Son, Inc., Joseph T. 2

Safety & Maintenance Company, Inc. 324
Salem Engineering Corp. 349
Salsbury Turret Truck 312
Schrader's Son, A. 46
Schramm, Inc. 374
Scovill Manufacturing Co. 213
Shakeproof, Inc. 195, 213
Sheldon Machine Co., Inc. 366
Shell Oil Company, Inc. 6
Signode Steel Strapping Company 366
Simonds Abrasive Company 325
Simonds Saw & Steel Co. 249
SKF Industries, Inc. 265
Skilsaw, Inc. 297
Smithcraft Lighting Division, A. L. Smith Iron Co. 346
Snap-On Tools Corporation 351
Socony-Vacuum Oil Co., Inc. 329
Sonneborn Sons, Inc., L. 224
Southington Hardware Mfg. Co., The 213
Speedi-Dri 324
Speedways Conveyors, Inc. 378
Square-D Co. ..... Third Cover
Standard Conveyor Co. 380
Standard Oil Co. of Indiana ..... insert 176, 177
Standard Pressed Steel Co. 373
Standard Register Co. 66
Stanley Elec. Tool Div., Stanley Works 200
Steel Company of Canada, Ltd., The 213
Sterling Bolt Co. 213
Stonhard Company 399
Stow Mfg. Co. 266
Strom Steel Ball Co. 368
Sturtevant Company, B. F. 64, 65
Sullivan Division, Joy Manufacturing Co. 383
Sun Oil Company 235
Sylvania Electric Products, Inc. 56

Taylor Co., Halsey W. 292
Taylor Chain Company, S. G. 328
Taylor-Winfield Corp. 300
Templeton Kenly & Co. 278
Texas Company 88
Thew Shovel Company 8
Thompson & Son Co., Henry G. 330
Tidewater Associated Oil Co. 53
Tinnerman Products, Inc. 175
Tomkins-Johnson Co. 70
Towmotor Corp. 333
Trojan Products Dept., Diversey Corp. 288
Trumbull Electric Mfg. Co. 379

Uarco, Incorporated 295
Union Pacific Railroad 14
Unitcast Corporation 34
United Chromium, Inc. 353
U. S. Electrical Tool Co. 334
United States Gauge—Division American Machine & Metals, Inc. 270
U. S. Rubber Co. 36
U. S. Steel Subsidiaries 30, 31, 326
Utica Radiator Corporation 18

Valley Electric Corp. 294
Van Dorn Electric Tool Co. 19
Vaughan Motor Co. 68
Veedor-Root, Inc. 293

Wagner Electric Company 72
Waldes Kohinoor, Inc. 215
War Assets Administration 356, 357, 390, 391
Watson-Standard Co. 362
Waverly Petroleum Products 324
Wayne Pump Co. 83
Weatherhead Company 239
Wells Manufacturing Co. 204
Weston Electrical Instrument Co. 81
Wheeler Reflector Company ..... insert 257
Wickwire Spencer Steel Division, The Colorado Fuel & Iron Corporation 336
Wiley & Sons, Inc., John 272
Willson Products, Inc. 226

Youngstown Sheet & Tube Company 273

•

INDUSTRIAL CONSULTANTS 386

•

SEARCHLIGHT SECTION

(Classified Advertising)

BUSINESS OPPORTUNITIES 395
EMPLOYMENT AGENCY 394
EMPLOYMENT SERVICE 394
INSTRUCTIONS 395
POSITIONS VACANT 394, 395
POSITIONS WANTED 394, 395
REBUILDING 395
Botwinik Brothers of Mass. Inc 395
SELLING OPPORTUNITIES 395
WANTED TO PURCHASE 395
USED EQUIPMENT 395, 396
American Air Compressor Corp. 396
Atlantic Varnish & Paint Co. 396
Bauer, L. W. 395
Botwinik Brothers of Mass. Inc. 395
Bolling & Co., Inc., Stewart 396
Chelsea Milling Co. 395
Economy Company 396
Electric Service Co., Inc. 396
Heat & Power Co., Inc. 396
Metropolitan Plumbing Supply Co., Inc. 396
Nussbaum & Co., V. M. 396
Vard, Inc. 396

LABELS don't solve Floor Problems

Rough floors mean rough handling. Smooth the way for safe trucking in your plant with STONHARD RESURFACER, the practical way to repair rough, rutted floors. Install STONHARD RESURFACER at a thickness of ½" right over your old concrete or wood floor. You'll get a tough, resilient new surface that pays daily dividends in safer, speedier operations.

Complete Satisfaction or No Charge is the Basis of Our Trial Offer.

For details and free floor maintenance guide, return the coupon.

STONHARD COMPANY
Building Maintenance Materials

Serving Industries Since 1922

806 Terminal Commerce Bldg.
Philadelphia 8, Pa.

STONHARD COMPANY
806 Terminal Commerce Bldg.
Phila. 8, Penna.

Please send us a free folder and details on STONHARD RESURFACER.

Firm .....

Mr. ..... Title.....

Address .....

City ..... Zone..... State.....

Offices out in the plant should be *flexible!*

Johns-Manville Transite Walls can be easily *moved* to meet changing industrial needs

THIS time, make sure *your* factory offices have *complete flexibility* . . . plus all the qualities of *permanent construction* . . . by using Johns-Manville Transite Walls.

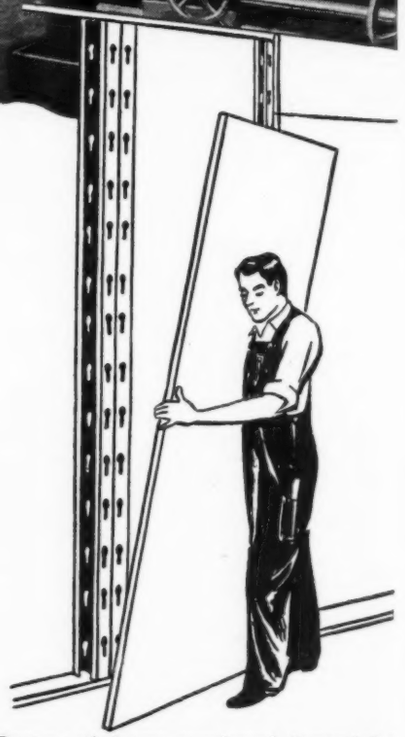
These modern, durable walls can be erected, or taken down and re-erected, almost *overnight.* Thus, offices and other factory areas can be efficiently enlarged, made smaller, rearranged, or relocated to meet changing industrial requirements.

Made of asbestos and cement, two practically indestructible materials, Transite Walls provide rigid, double-faced partitions. They can also be used as the interior finish of the outside walls.

The easy-to-handle panels are mechanically fastened together . . . are interchangeable . . . and they're 100% *salvageable.*

Built to withstand severe shock and abuse, Johns-Manville Asbestos Transite Walls are also fireproof and sound-resistant. Their hard-to-mar surface is projection-free . . . has an attractive natural gray color which may be left as is or decorated, if desired.

For further details about these time- and money-saving walls, write for 20-page booklet, *J-M Transite Movable Walls.* Johns-Manville, Dept. FM-12 Box 290, New York 16, N. Y.

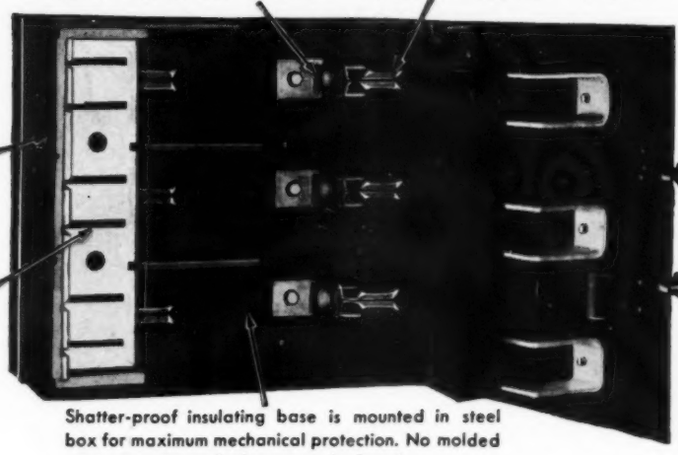


Because of the unprecedented demand for J-M Building Materials, there may be times when we cannot make immediate delivery. We urge you to anticipate your requirements.

Johns-Manville *Asbestos* TRANSITE WALLS

Notice the sound design and rugged construction of this Saflex Switch Unit

A good reason for choosing Saflex Distribution Panelboards



Solder-solderless lugs can be used either as solderless connectors or as solder lugs or both. Furnished on all except 30 ampere, 250 volt units.

Positive pressure fuse clips have high conductivity and assure automatic contact pressure at the fuse terminals without auxiliary parts.

Cam-action provided by handles near switch jaws where it is most needed. This cam-action supplies (with minimum manual effort) the considerable force necessary to provide high contact pressure.

Cover can be locked in either the ON or OFF position by means of a padlock on the bracket.

Arc suppressor block greatly increases the rupturing capacity.

Ranging from 30 to 600 amperes, Saflex Switch units are for use in systems up to 575 volts A.C. or 250 volts D.C.

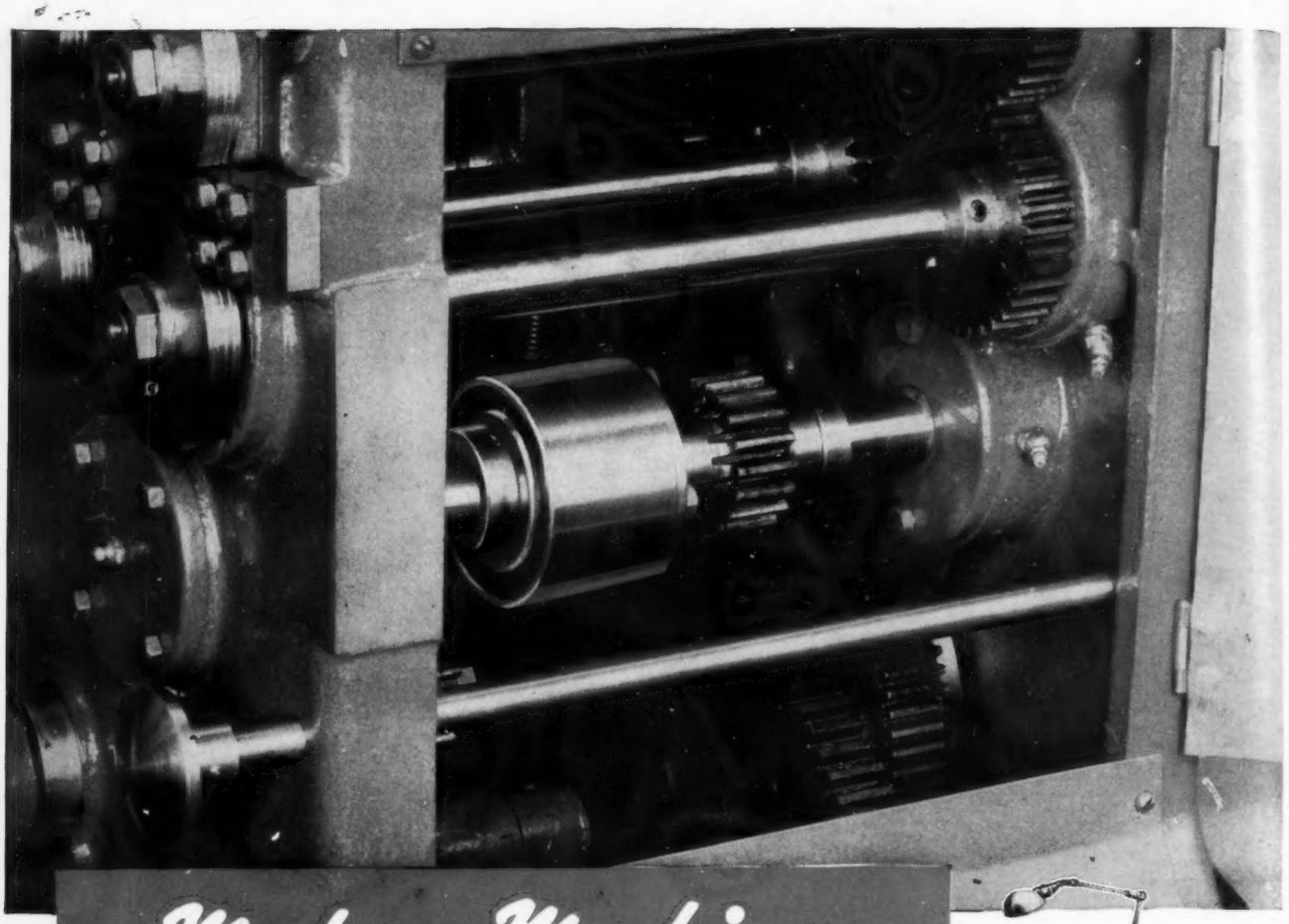
Shatter-proof insulating base is mounted in steel box for maximum mechanical protection. No molded parts are exposed when cover is closed.

● Notice how simplicity, sturdiness, and safety are built into Saflex Switch units. Opening and closing unit doors operates switch units. Door is permanently anchored; it carries switch blade assembly only, and covers all live parts when closed. When door is open, all accessible live current-carrying parts are dead. All circuits may be opened safely under maximum load. All poles are broken simultaneously, preventing single-phasing. All units except 600 ampere size have rotary switch units. Yale locks on panel cabinet doors prevent unauthorized access. • For fast, simple installation, panel box has oversize wiring gutters and may be shipped separately for roughing in during early stages of construction. Interior and front are separate units, and may be installed later.

Write for Bulletin 2500. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

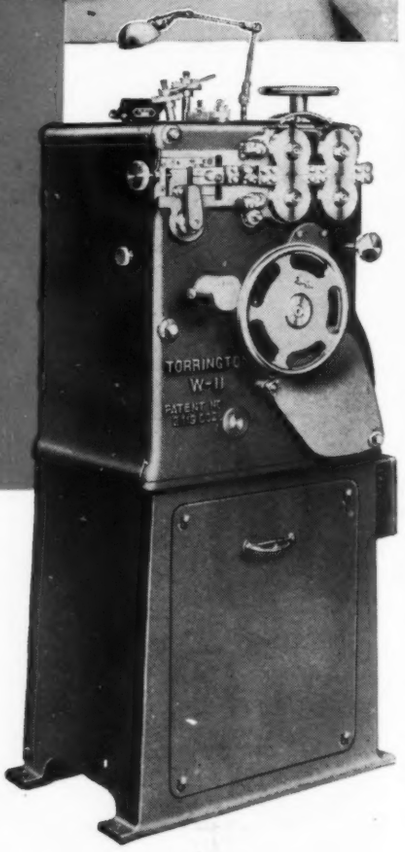
SQUARE D COMPANY

DETROIT • MILWAUKEE LOS ANGELES



Modern Machines Deserve Morse Clutches

FREE WHEELING AND INDEXING



Torrington Spring Coilers work to tolerances of thousandths of an inch. Precision is imperative! Equipped with the Morse Indexing Clutch, Torrington achieves positive and consistent accuracy.

MORSE CHAIN COMPANY • Ithaca, N. Y. • Detroit 8, Mich.

A PRODUCT OF B-W BORG-WARNER

MORSE ROLLER and SILENT CHAINS and COUPLINGS